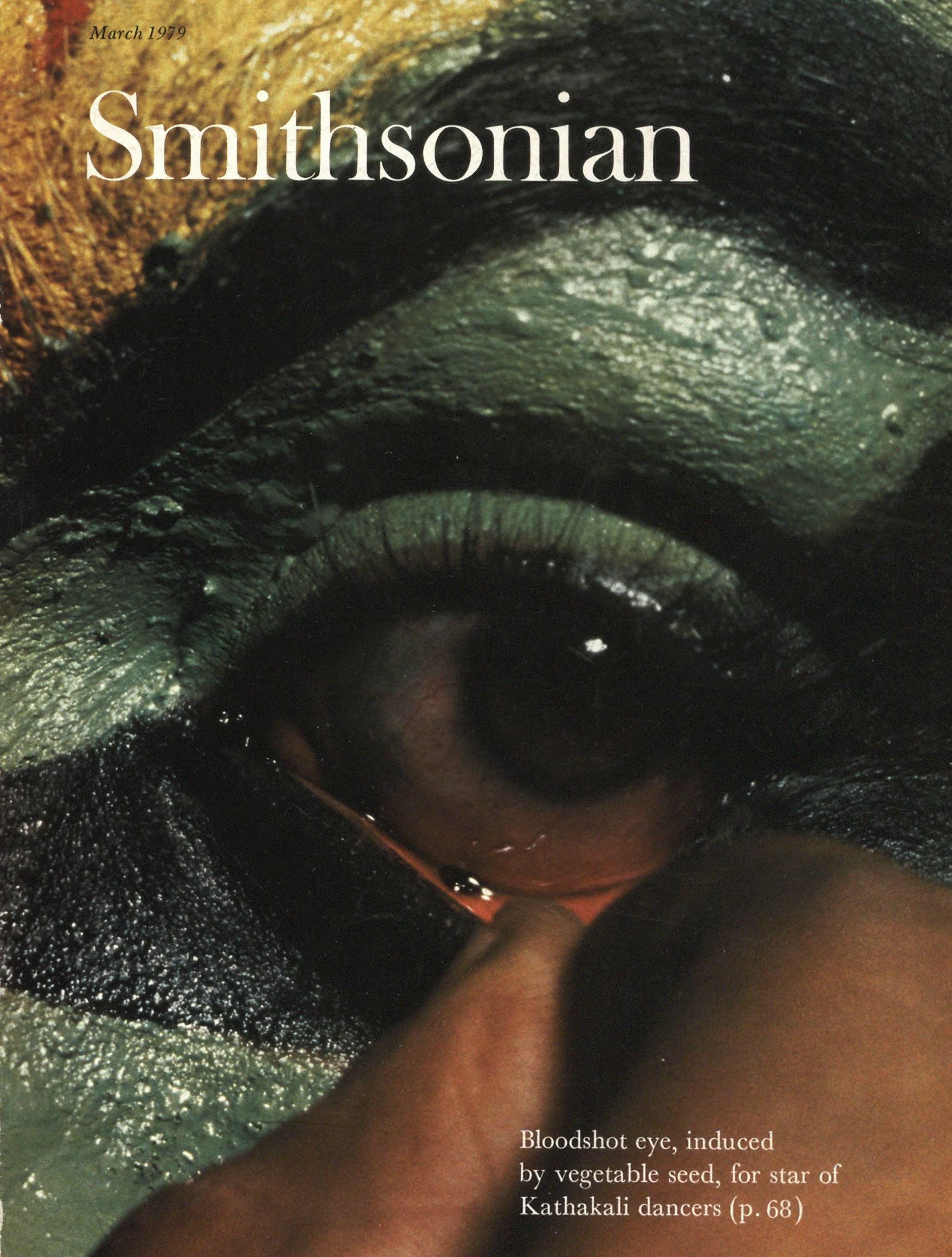
March 1979

Smithsonian



Bloodshot eye, induced
by vegetable seed, for star of
Kathakali dancers (p. 68)

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Secretary Ripley's comments

The view from the castle

A birthday wish for the Smithsonian's longtime friend and colleague in research, the United States Geological Survey

The U.S. Geological Survey, which celebrates its centennial this month, is the subject of an article beginning on page 40 of this issue. One cannot think of that agency's origins without thinking of the Western lands as they were a hundred years ago, when the mysteries of the continent were still to be revealed. To scientists of the mid-19th century, the West was like a Holy Grail. As in the Apocalypse, out there it was possible to see "a new heaven and a new earth." The West beckoned to scientists from the Smithsonian, then a young establishment, and also to those who would ultimately form the nucleus of the Geological Survey. The early histories of the organizations were thus intertwined; the Smithsonian played a part in the Survey's beginnings, and the two institutions often had interlocking directorates.

After the Civil War, scientists from the Smithsonian, the Corps of Engineers and the Interior Department began to investigate the continent's archaeology, its fauna and flora, and above all its geology. A principal figure in this period of discovery and exploration was John Wesley Powell, a Civil War artillery officer who in 1869 led an expedition by boat down the Green and Colorado rivers and through the Grand Canyon. The publicity that his exploration produced, and the impetus of cognate expeditions under Clarence King, F. V. Hayden and George M. Wheeler, resulted in the legislation that established the Survey a century ago.

Specimens from the field work of the Powell survey (1872-1878) were eventually consigned to the National Museum of the Smithsonian, and from the very beginning the Smithsonian and the Survey maintained the closest relations. Powell's own wide-ranging interests encompassed not only geology but the culture of American Indians. For many years he served both as director of the Survey and, until his death in 1902, as chief of the Smithsonian's Bureau of American Ethnology, in which capacity he began to build our collections and amass information about tribes that, in Powell's time, seemed to be rapidly disappearing.

Many of the Geological Survey staff members were quartered in the original U.S. National Museum, now the Arts and Industries Building, where they worked on fossil materials from across the country. A paleontologist, Charles D. Walcott, succeeded Powell as director of the Survey in 1894, and left that post only to head the Smithsonian in 1907.

Despite new responsibilities, the Survey remains a bureau of research, equivalent in its performance to the best academic departments of geology and paleontology. The Smithsonian is proud to have some 28 paleontologists from the Survey currently working beside our paleobiologists in the National Museum of Natural History, and our archaeologists associate closely with the Survey's field investigators.

Today there is some public suspicion about the costs of basic research. It is thus reassuring to consider what the Survey has *produced* for the citizens of the country —a wealth of knowledge not just about paleontology, but about our oil and gas and mineral resources. We may count ourselves fortunate if basic science—and the U.S. Geological Survey—flourish as long as our "new heaven and new earth" endure.

S. Dillon Ripley

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S-3-79

Around the Mall and beyond

St. George and the Dragon, as you can plainly see, is an elegant new acquisition in that hall of riches where the big gems hang out on the top exhibit floor of the Museum of Natural History. The photograph below is precisely life-size, but does not include the base, a heavy pedestal of malachite. The sculpture that you're looking at is mostly gold, some of it enameled, with a fair bit of platinum thrown in and some of that, as on the horse's trappings, set with rubies and diamonds and other good stuff.

I love these little trinkets, and soon after this one was installed I joined the usual throng that troops into that softly carpeted sanctum to drool over the Hope Diamond and the Star of Asia sapphire (330 carats) and the Rosser Reeves Ruby from Ceylon and the Logan Sapphire (423 carats) and the Victoria-Transvaal Diamond and the Emperor Maximilian Ring (emerald) and Marie Antoinette's earrings and Mrs. Marjorie Merriweather Post's tiara and other delights. St. George was doing his thing with the Dragon in front of a less covetous audience because his precious stones are more discreet.

The sculpture was presented to us by Mr. and Mrs. John Levey and Mr. and

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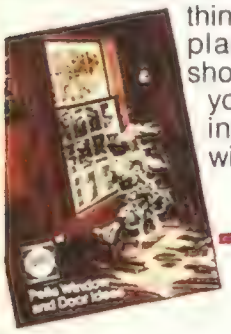

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I don't know where the Leveys, *père et fils,* picked up St. George and the Dragon, but I do know that the sculpture was done in 1882 by Grachev Brothers, jewelers to the Czar. When it comes to Czarist Russian jewelry, one thinks first of Fabergé who did so many things (Easter eggs of gold and diamonds, for example) for the last Czar, Nicholas II (see last month's stereograph article). But there were many others who achieved royal favor and the Grachevs were among them.

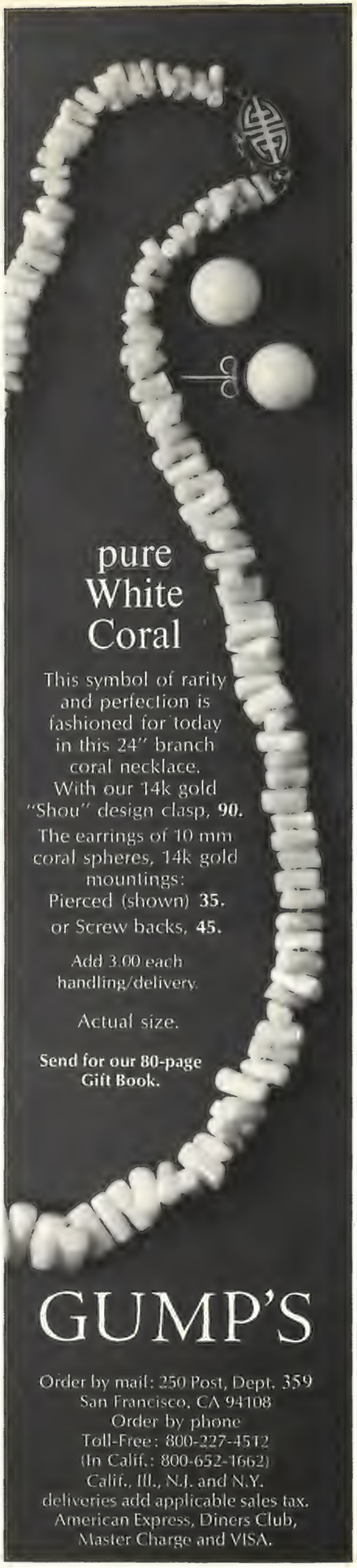
Judging from the date, they may have produced St. George for Nicholas' father, Czar Alexander III, a mountainous man of huge physical strength. Robert Massie, in his fine book, *Nicholas and Alexandra,* recalls the meal during which Nicholas' dad was playing host to the Austrian Ambassador. It was a tense time in the Balkans, and the Ambassador stiffly remarked that his country had two or three army corps ready for mobilization at the border.

Mighty Alexander picked up a solid silver fork, twisted it into a knot with his great hands and flung it on the table. "That is what I am going to do to your two or three army corps," he said.

It's a good thing St. George wasn't twisted around, because this little statue is far more intricate and delicate than a silver fork. Paul Desautels, curator of minerals, says he peeked inside the gold visor in search of the saint, but that he wasn't home. He says he made that little remark at a press conference when the statue was presented, and the press reported it with dead-pan accuracy. Having been a newspaperman myself, I recall that the sight of such an extravagance as this would shock us into a sort of glazed meticulousness.

Desautels says the malachite base is typical of Russian pieces. Malachite, for the benefit of all of you who, like me, took freshman biology instead of geology, is a copper hydroxyl-carbonate. After you've seen St. George, you can find some malachite in the cases that contain raw minerals, outside the gem collection. Most of it seems to come from Bisbee, Arizona, and a good bit comes from Zaïre, but Russia also was famous for it, and the Russian jewelers used it beautifully.

One example of malachite, incidentally, is trapped in the folds of another mineral. Says the caption card: "Pseudo-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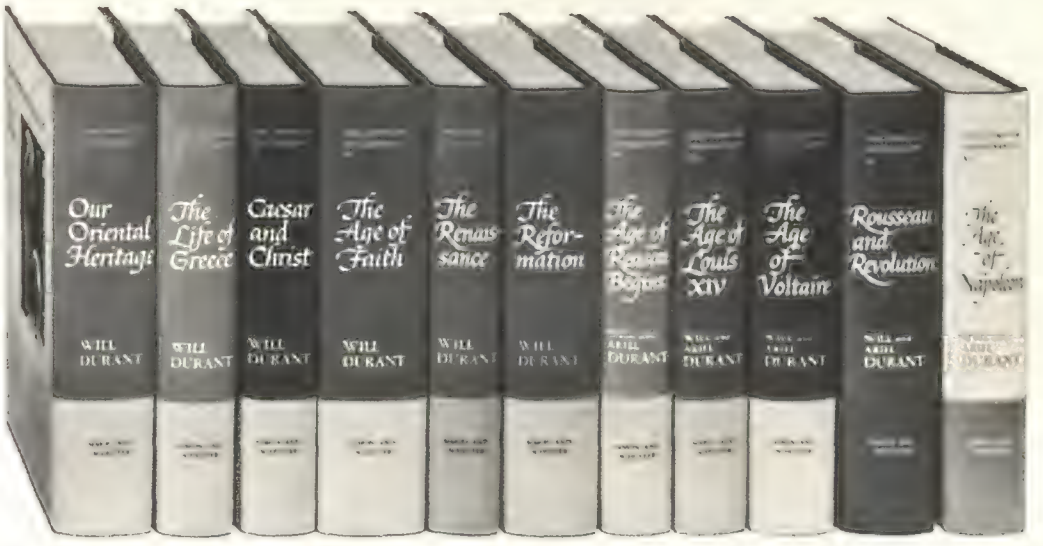

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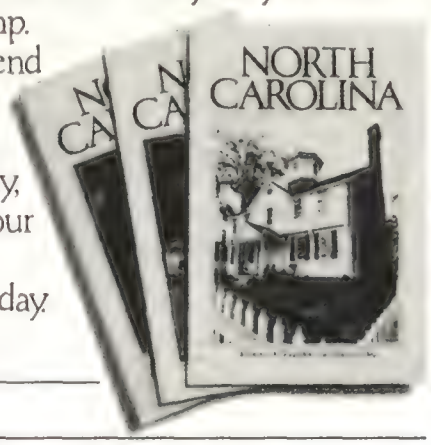

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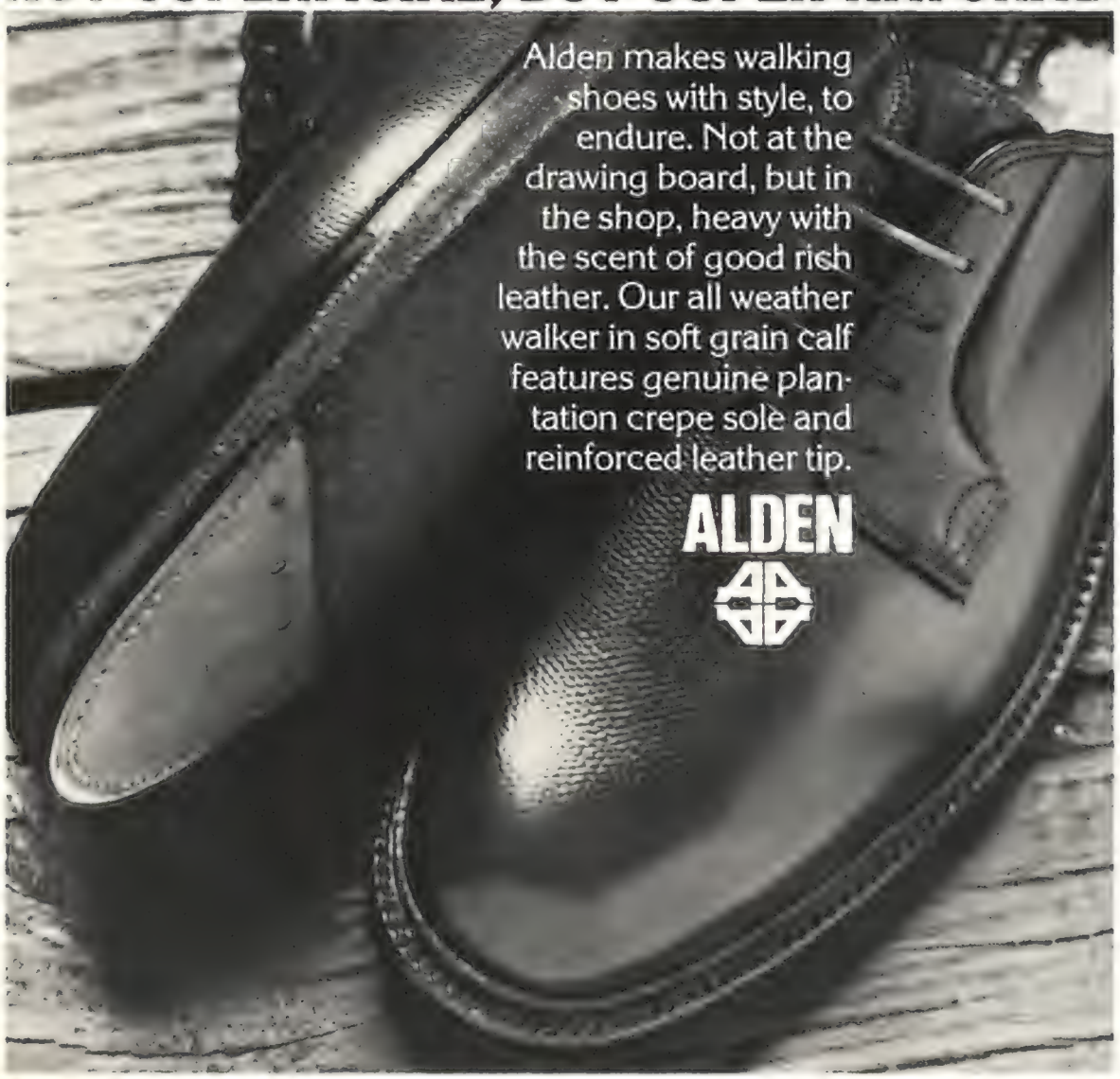
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morph on smithsonite." And if smithsonite means nothing to you after all this time, you'd better do some solid cramming or you'll never get through finals.

The malachite base upon which George's steed rears is octagonal with a dark molding above and below the walls of marbled green. Most attractive and if people ask you, tell them it's very Russian.

Not far from the statue is another Russian item, a chalice made for Catherine the Great in St. Petersburg in 1771 as a memorial to her lover, Grigori Potemkin, who had just died. The chalice is gold, studded with 1,300 diamonds. Obviously Grigori had charm.

I stumbled upon another love affair over at the Air and Space Museum. There, at the "Flying For Fun" display on the ground floor, was a perfectly average Middle-Western manufacturer slavering over the Aeronca that forms the major display of the fun flying machines. He was moving from one angle to another, searching out a more meaningful view for his camera. He was reading the placard describing the plane, taking notes, then rereading it all. He was occasionally standing still beside the little, funny, pug-nosed plane—or at least as close as he could get to it.

I should have said "get to *her*." I had no sooner established contact with this man, than I realized I was butting in on a reunion of lovers. For Jack Oettinger, vice president of the Atlas-Lederer Company of Cleveland, used to fly Aeroncas many years ago.

"This model is a C-2," he told me. "I had one, but with the wider landing gear. Then I had the C-3, which could hold two people, side by side. It was called the Collegian or Razor Back because it had the same triangular cross section as this C-2, with a longeron running up the spine. I spun one into a mountain in Maryland once. Some of the later models had a rounded fuselage. The broad landing gear had balloon tires, too, and they served as the only shock absorbers. They were fine planes, both models, and you were wrong to call them 'fairly rotten' in your column."

I instantly agreed with that last, because any plane that inspires such loyalty is not rotten, no matter what else it (I mean "she") may be. But the small sentence that Mr. Oettinger had spoken about spinning into a mountain had by

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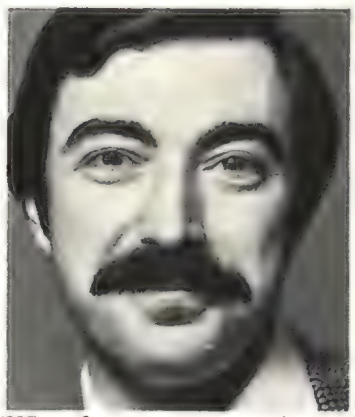

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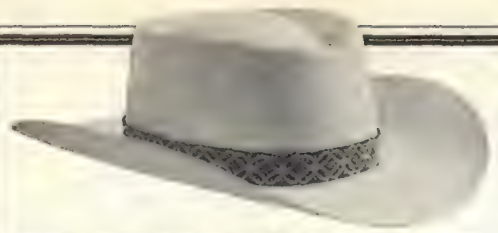

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now shouldered its way past all the others and stood right in front of me.

"What's this about spinning into a mountain in Virginia?" I asked.

"Maryland," he corrected. "South Mountain. I was in the C-3, on my way from Cleveland to Washington. September 1937. Nasty fog. First thing I knew, there was a mountain in front of me, so I tried to get over it and around it at the same time. Climbing, turn, see? She stalled out, right above the trees, and spun in. Didn't hit very hard because I wasn't going very fast at that point. There was a gas tank in front of me with padding on it, and I hit that with my face. Busted my nose and gave myself a couple of shiners. Also, I did in a couple of ribs."

South Mountain figured in the Civil War. Lee left a rear guard there while he moved on toward Pennsylvania in September 1862, on the campaign that ended with the Battle of Antietam, or Sharpsburg. The Union troops under McClellan were held up at this mountain exactly 75 years before my friend was. Proud of my Civil War knowledge, I pointed this out.

"All I know is, South Mountain had rattlesnakes," Jack said. "I landed in a nest of them. You know how you feel when you've spun into a mountain? Sort of confused, right?"

I did not know, but it sounded feasible.

"Well, the first thing I heard when I got free of the wreckage was a buzzing sound. Damn rattlesnakes all around."

Jack was rescued by the Smithsburg, Maryland, volunteer firemen, who struggled up the mountainside on a logging road in an air-cooled Franklin with a wooden chassis and a sloped hood. Jack likes mechanical things and loved the car. He was worried that the logging road was pretty hard on it. He was also worried about some of the older firemen who weren't used to such a lot of exercise so far from the old pinochle board. And he continued to be worried about the snakes.

Everything worked out OK, though, and Jack and his rescuers, and I guess the snakes, all made the front page of the local paper. And so did the Aeronca, which proved it was not at all a rotten plane by allowing Jack Oettinger to step out of it in good enough shape to be worried about all those other things.

A long time ago—I looked it up and it was in October 1976—I wrote about a young man named Brian Jensen who ran the

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orchestrion, that marvelous music machine in the 1876 exhibit at the Arts and Industries Building.

I saw Brian the other day. He's just the same except, presumably, two-and-a-half years older, and now he's doing all sorts of mechanical things with the 1876 displays. When I saw him, he was rewinding the lighthouse beacon (SMITHSONIAN May 1976).

The lighthouse beacon is a fine big rotating one, built in Paris, with Fresnel lenses behind which we have put a 150-watt bulb. That's cheating, of course, because in 1876 it would have been a kerosene lamp—a good bright one, but still just an oil flame. With the magnification of the lens, it hit, according to the caption on the display, 400,000 candlepower.

It was designed to rotate at a certain rate so that its six beams, where the light is concentrated by three double Fresnel lenses, would flash past a vessel at a certain interval—say a double flash every four seconds. Since lighthouses have different intervals (*i.e.* rates of rotation) the number of seconds between flashes identifies each light and tells the skipper where he is. Now you all know how to navigate, right?

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Brian Jensen says that once he winds up the lens assembly, it takes about 20 minutes for the weight to reach the floor, so he doesn't do it all the time. "In a real lighthouse," he said, "the length of time between rewinds depended on the height of the tower, since that was the distance the weight had to drop. It might take, say, three hours. What with winding it up and trimming the lamp wick, a keeper had plenty to do."

Jensen also said that he has sometimes stood on the turntable, cleaning the lenses, while the beacon is rotating. "What with all the prismatic effects, it's a weird feeling. Like being in a disco. You seem to be spinning much faster than you really are."

I promised I'd try it.

—EDWARDS PARK

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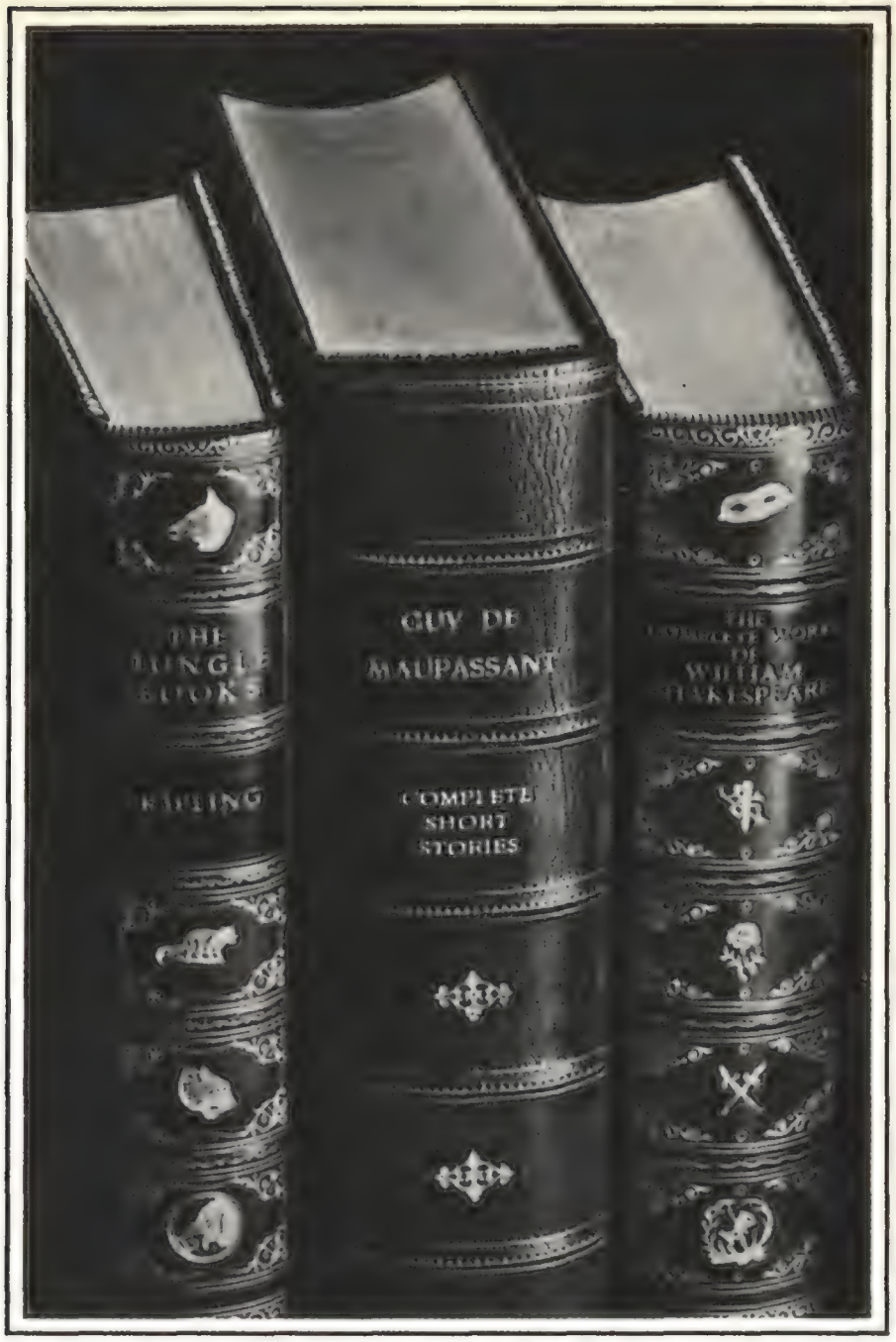

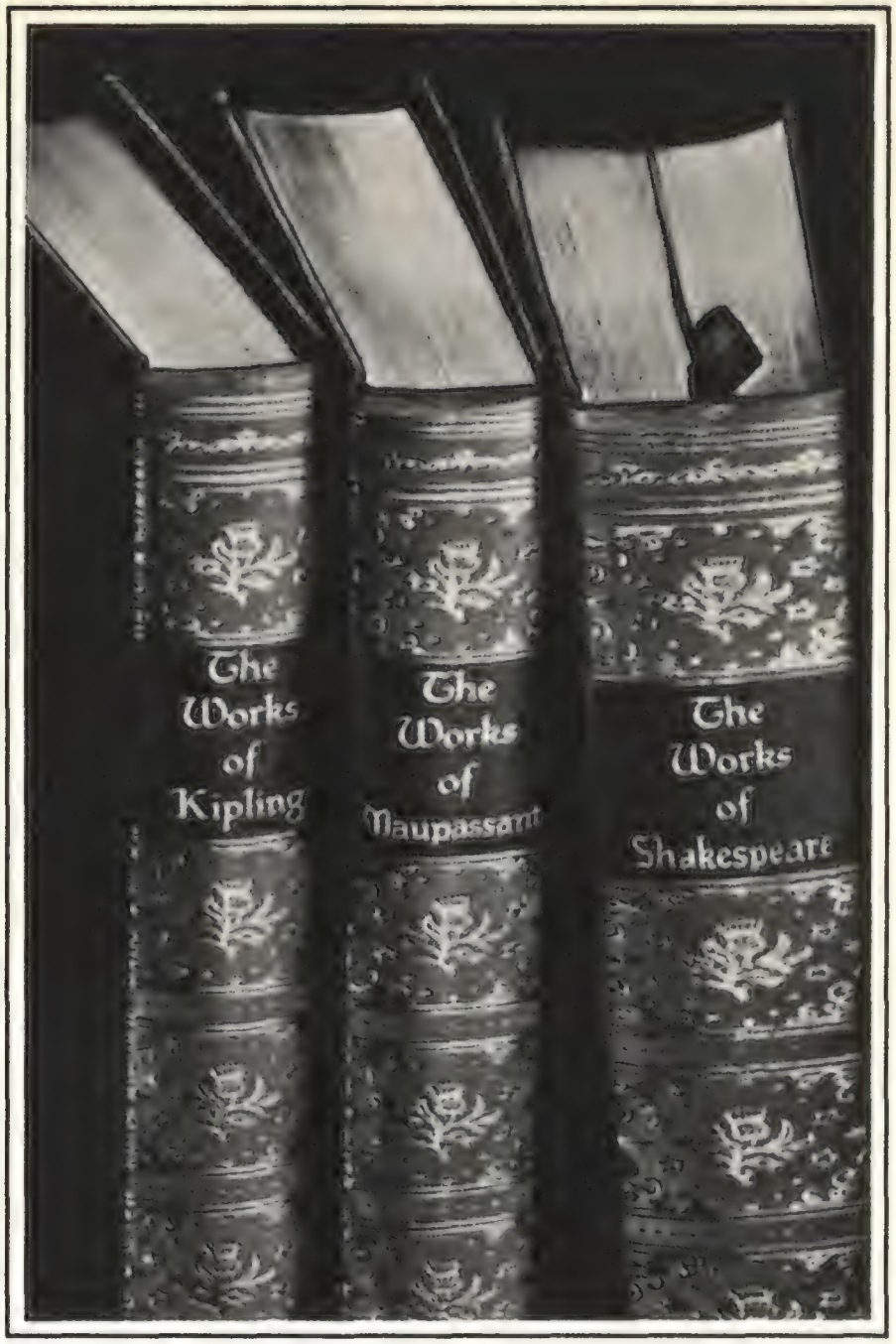

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Letters to the Editor

Grévy's zebras

Dear Sir: John Reader's valuable article on Grévy's zebras, in the January issue, causes me to be very disturbed by the entire operation conducted by Don Hunt. I hope that others will voice their disgust with the violent, brutal and destructive manner in which these beautiful animals are being handled.

Some years ago, Jomo Kenyatta made this promise to the world: "The natural resources of this country—its wildlife which offers such an attraction to visitors from all over the world, the beautiful places in which these animals live, the mighty forests which guard the water catchment areas . . . are a priceless heritage for the future. The Government of Kenya . . . pledges itself to conserve them . . . with all the means at its disposal."

I have been a student of Africa most of my life, have quite an extensive library on the wild animals, have traveled and photographed in Uganda, Tanzania and Kenya. I have a great reverence for all wildlife. It is my hope that the translocation of Grévy's zebras from their present natural terrain can be stopped.

James L. Garden
Santa Cruz, California

Dear Sir: Don't be too hard on Don Hunt. I lived for several years a few miles from Tsavo park, on the Tanzania side, and have seen the problems of saving Africa's wildlife. Attempts at this should be welcomed, even though as "modern-day Noahs" we aren't always as successful at saving the species as he was.

The Reverend James H. Wente
Killeen, Texas

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Dear Sir: I am appalled that Mr. Hunt (and others) are regarded as wildlife experts solely because they have been around animals for a long period of time.

For those who believe that the future of dwindling species rests on their introduction to parks or zoos, I would point out that these projects as a whole are still consumers rather than producers of wildlife. I am not suggesting that we stop trying—only that a great deal more care, research and inspection must be applied to these projects.
Joan Friedlander
Tucson, Arizona

Bernard Berenson

Dear Sir: Alexander Eliot's article, "Berenson's life as a connoisseur was a fine art," defines his skill in assigning old drawings and paintings to the right masters, but it does not credit the basis of Berenson's connoisseurship. It was Giovanni Morelli, who was born in Verona in 1816 and was a medical student, who made a science of distinguishing the master from the imitator on such idiosyncrasies as the shape of a fingernail or the lobe of an ear.

Berenson rediscovered what is now known as the "Morellian method."
Jacob Rosenberg, M.D.
Brooklyn, New York

In Sylvia Sprigge's book, Berenson, *Mary Berenson is quoted as saying that after Berenson met Morelli and his friend Cavalcaselle, he turned "from a passionate amateur into a young professional."* Ed.

Cities

Dear Sir: I am a 13-year-old Grosse Pointer, and I would like to take issue with Richard L. Williams' comments on Detroit in his article, "Our older cities are showing age but also showing signs of fight." He said the Renaissance Center is "unapproachable on foot," but it has five entrances easily accessible to pedestrians. As for its being a "fortress," the concrete berms built in front of RenCen are simply for housing the heating and cooling systems.

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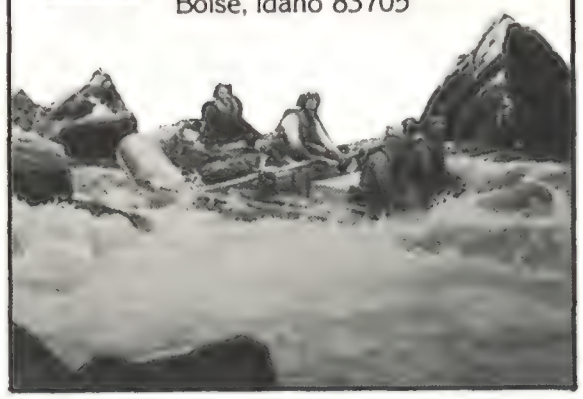

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There was nothing in your article about the new apartment buildings to be built this spring, which are expected to attract office workers to live downtown. Nor did you mention plans for a new Rockefeller project next to RenCen.

Jeffrey Ligan
Grosse Pointe Park, Michigan

It is true that downtown workers can stroll into the Center to shop, but loads of people come down to RenCen only because buses from the suburbs whisk them in and out of the parking lot. Many people are still frightened to be in downtown Detroit, but it is true that it is safer than it was a few years ago when it was tagged the "Murder Capital" of the nation. Ed.

Dear Sir: Detroit, I believe, has to be the foremost example of a city rebuilding itself and a good example of faith in the future of the city by its residents. Since the RenCen, numerous developments have been started in an effort to continue to revitalize the city: a multimillion-dollar medical center, the new Joe Louis Sports Arena, several downtown malls and neighborhood renovations, to name a few. Give Detroit a chance.

Steve Wasko
Detroit

One cheery note for the hometown: the Republican National Committee has given Detroit a vote of confidence by choosing it as the site of its 1980 national convention. Ed.

Winston-Salem and the arts

Dear Sir: Winston-Salem's prominence in the arts, as Bennett Schiff's article points out, has come about because civic leaders like R. Philip Hanes jr. don't just sit in policy positions on cultural boards—they roll up their sleeves and *work*. When I moved to Winston-Salem in 1958 fresh out of college, I volunteered my limited talents to some of the local cultural groups and was astonished to find myself immediately working side by side with the Haneses, Reynoldses, Grays, Bahnsons and other representatives from the city's long-established, and generally wealthy, families. I quickly became aware that Winston-Salem's cultural pulse derives from a very genuine, non-elitist view of the importance of the arts at all levels.

John C. McConnell
Charlotte, North Carolina

Dear Sir: In view of your articles on art in Winston-Salem and on Roger Stevens as the guiding force of the Kennedy Center, I thought you would be interested to know that the North Carolina School of the Arts will name its proposed new art center "The Roger L. Stevens Center for the Performing Arts."

Nananne Porcher
New York City

Integrated Pest Management

Dear Sir: Daniel Jack Chasan's discussion of IPM (Integrated Pest Management) introduces readers to a currently publicized movement, but the reader must not be misled into believing IPM is some revolutionary new and simple approach to pest problems, the magnitude of which most urban readers have little appreciation. Industrial, university and USDA dedication to research has provided the pest control know-how that has contributed to our agricultural progress. This success has been belittled and maligned by some who deny the benefits and exaggerate the hazards. Of course the system can be improved, and this is the aim of all concerned participants. If the new publicity on the old IPM concepts does nothing more than unite those involved in a better appreciation of the many aspects of pest control, then better pest control can result.

Incidentally, Mr. Chasan's figures are misleading regarding his comparison of 100 insecticides used in China versus 21,000 in the United States. EPA's published list of all types of pesticides (insecticides, fungicides, rodenticides, bactericides, etc.) for 1976 totaled 1,505 chemicals. About 275 of these are classed as insecticides, including items such as boric acid.

Ely M. Swisher
Perkasie, Pennsylvania

Instead of 21,000 "insecticides," we should have referred to commercial "products." The latest estimate available for chemical pesticides is 1,800. Ed.

Phenomena, comment and notes

Dear Sir: Taken in by the arguments of undernourished scientists, James K. Page lends credibility to the assertion that obesity is a social as well as an individual problem. Dieting on a massive scale might result in the combination of higher birth

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rates, lower death rates and extended life spans, which would drastically inflate the demand for services and energy. It seems obvious, therefore, that socially conscious people should overeat.
Sidney Hack
Columbia, South Carolina

Shed a tear, and a quarter . . .

Dear Sir: The lament regarding the skyrocketing cost of candy bars, by Richard L. Williams, struck a responsive chord. For those of us who have an incurable chocolate habit, the situation is indeed grave. There is, however, an error in the geography lesson cited. Cacao grows much closer to the equator than 30 or 40 degrees. There are some commercial cacao plantations as far as 20 degrees south in Brazil, but the best quality chocolate comes from beans grown mostly within ten degrees on either side of the equator.

Would that Mr. Williams were correct. If so, we could be raising cacao beans all along the Atlantic seaboard almost as far north as New York. We could replace tobacco lands in the South with cacao and make both the kids and the U.S. Surgeon General happy.
Mildred Berman, professor of geography
Salem State College
Salem, Massachusetts

Dear Sir: I can still remember asking Grandma for a penny for some candy and bouncing off to the corner store. There were three shelves of varieties of penny candy, and the owner would wait patiently while I made up my mind. At the same store, sundaes made with homemade ice cream, real whipped cream and a cherry were only 15 cents.
Jessie Lang
Kearny, New Jersey

Dear Sir: I am 12 years old, and I think all of the kids in the United States should stop buying candy until the candy companies lower their price to 15 cents a bar.

Come on, candy companies—not every family or kid can afford 25 cents for one candy bar. I for one am not going to spend 25 cents for a candy bar, and I figure that I'm doing my teeth as well as my pocket a big favor. If all the kids feel the way I do, those candy companies will lower their prices or go out of business!
Kathy Maguire
Vienna, Virginia

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Phenomena, comment and notes

Why gibbons sing, the advantages of primogeniture, a hazard of good insulation and the hoaxer revealed

In the early 1910s, some fossils began to emerge from a gravel pit in Sussex, England, climaxing in the discovery of a human skull of which the cranium was very much like ours, the jaw very much like an ape's. It was immediately proclaimed by English anthropologists as "the missing link." It was reassuring to know that so important a step in human evolution had taken place in Albion—so reassuring, indeed, that when an associated artifact turned up in the form of a bone fashioned into the shape of a cricket bat, the patriotic scientists failed to smell a large rat.

The skull was, of course, Piltdown Man, one of the most extraordinary scientific hoaxes of all time. No one has ever had a sure idea of who perpetrated it. People have assumed that Charles Dawson, the solicitor and amateur geologist who made the find, was the culprit, but doubt lingered because Dawson would not have had an easy way to get his hands on all the bones with which the gravel pit was salted.

The finger has now been pointed in another direction. Shortly before his death last year, a former professor of geology at Oxford, J. A. Douglas, tape-recorded his thoughts on the matter and they are, in short, that his predecessor at Oxford, a Professor Sollas, was probably the guilty party.

Sollas, it seems, had a bitter dislike for an anthropologist named Arthur

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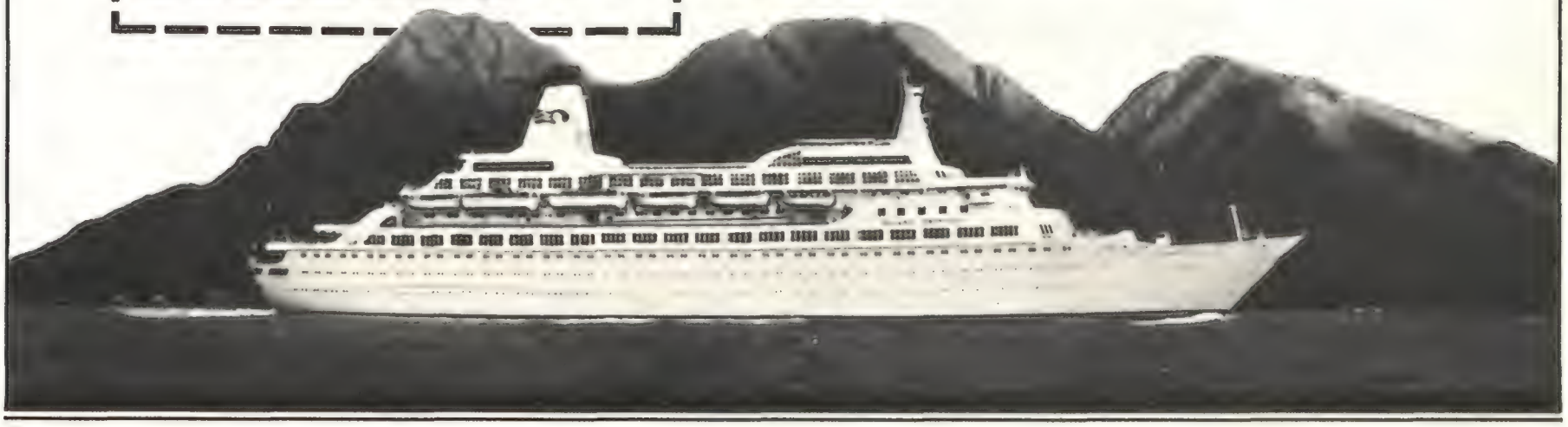

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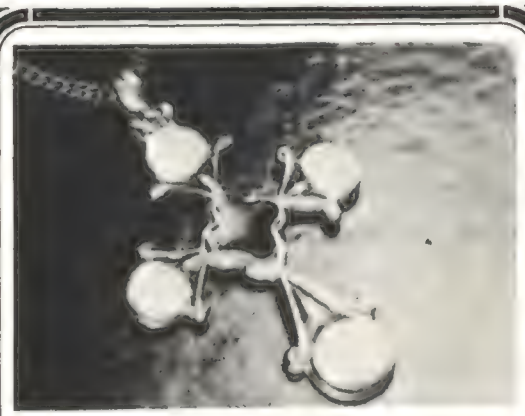

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Smith Woodward who assisted Dawson in identifying the finds. Smith Woodward was apparently pretentious but lacking in actual expertise. Once, when he wrote to Sollas asking for the loan of a student to do some work on ichthyosaur skulls, the uncooperative Sollas turned him down flatly. At Smith Woodward's request, Douglas tried to get Sollas to reconsider, but it was no go. On the other hand, Sollas not only knew Dawson but had visited him and—the plot thickens—had easy access (which Dawson did not)

'Piltdown Man' was reconstructed . . .

Arthur Smith Woodward, right rear, was the principal victim of the

to most of those items used in the fraud.

The evidence, as reported in *Nature* (Vol. 276, No. 5683), is circumstantial but compelling: 1) Smith Woodward had earlier been deceived by a schoolboy hoax—some kids had carved a horse's head on an old bone. Smith Woodward fell for it and Professor Sollas, who had known it was a fraud, let Smith Woodward make a fool of himself by publishing an elaborate description of the "ancient" carving; 2) Sollas' successor, Professor Douglas, recalled sending some mastodon bones

AP

. . . in the scandalous missing-link hoax.

fraud in which Charles Dawson, on his right, apparently conspired.

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from Bolivia to Sollas in 1910 and mastodon bones also turned up in the gravel pit; 3) Sollas ordered and received some potassium dichromate around that time, a substance he would have had no professional use for, and a substance with which some of the skull fragments were found stained.

Thus, it seems that Dawson, the solicitor, may have been talked into trying to make a fool of Smith Woodward by his bitter rival, Sollas, who supplied Dawson with the material for the hoax. The joke then got out of hand—what with the British Empire's reputation suddenly at stake and all that—and so all hands decided to remain mum.

Song of the gibbon

One of the predominant impressions one gets from a visit to the National Zoological Park in Washington is that there are a couple of lunatics loose somewhere near the Reptile House. The lunatics are two gibbons, and you could hear them whooping, I would have said, a mile away. What all the noise was about I never asked, but a report by Dr. Paul Gittins of the University of Wales in *New Scientist* (Vol. 80, No. 1133) provides some background.

Dr. Gittins spent a couple of years living in gibbon country (Malaysia and Sumatra) listening to them sing. Gibbons live in monogamous pairs with up to four offspring, each family having its own territory which the male defends vigorously from single interlopers or from invasion by a family from an adjacent territory. There, in its piece of the rain forest, the family spends most of its day eating fruit, but a significant amount of time is reserved for singing.

Dawn is the main songfest. About an hour before sunrise the adult male begins a solo from the sleeping tree. It consists of whoops and whoo-aas in a regular sequence every few minutes. At sunrise, the male gibbon's mate joins in with some whoops and whoo-aas. This causes the male to stop singing and the female then comes forth with "great calls," regular series of pure notes that rise to a climax and then descend. At the end of each great call, the male gives forth a characteristic coda of whoops and whoo-aas.

Later, after the troop has had its first feed of the day, the singing begins again. This song bout is shorter in duration and the female gives great calls throughout.

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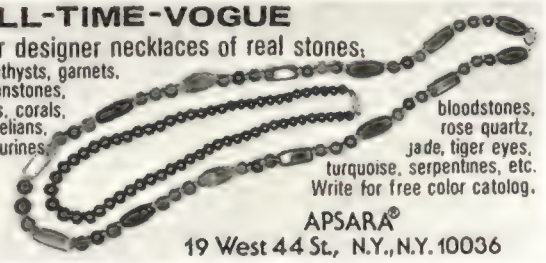

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What's all the singing about? Dr. Gittins finds that gibbon song has much the same function as birdsong. It establishes in the minds of nearby gibbons the fact that a particular territory is inhabited and will be defended. (It has been found that if there are interlopers anywhere around, the male gibbons will sing longer. When it's just the same old neighbors in their same adjacent territories, a shorter song will suffice as a reminder to keep off the singer's grass.) Bachelor males also sing from unoccupied territory, seeking a mate. These songs are longer than those of a paired male but, once successful in his quest, the male "adopts the normal vocal pattern of a family man." Young males are discouraged from singing by their parents, presumably to avoid attracting some loose female to the territory.

The female's great calls, on the other hand, are another kind of advertisement: they let any footloose floozy in the area know that this particular male is happily mated, baby, so get lost. Daughters are permitted to sing along with Mom, making the message positively unambiguous.

Number one has all the luck

A few years back, two researchers—one was Lillian Belmont of the New York State Psychiatric Institute and Columbia University—found, by studying nationwide data for the Netherlands, some pretty convincing evidence that the order of birth has a significant effect on intelligence—in favor of the early born. Other investigators suggested that this effect is more a result of spacing: siblings born close together eventually would show this effect, whereas siblings born far apart would not. Indeed, it was hypothesized, in a two-child family with a long interval between births the advantage in intellectual ability might go to the second child.

Back to Dutch data went Dr. Belmont and her associates to examine the records of 535 pairs of brothers and 1,511 unrelated firstborn and secondborn young men. Applying more sophisticated statistical analyses than seem worth going through here (especially because I don't understand them), the researchers found that spacing between siblings in two-child families has no effect whatsoever on the intellect of either. The odds remain in favor of number one, no matter when number two comes along.

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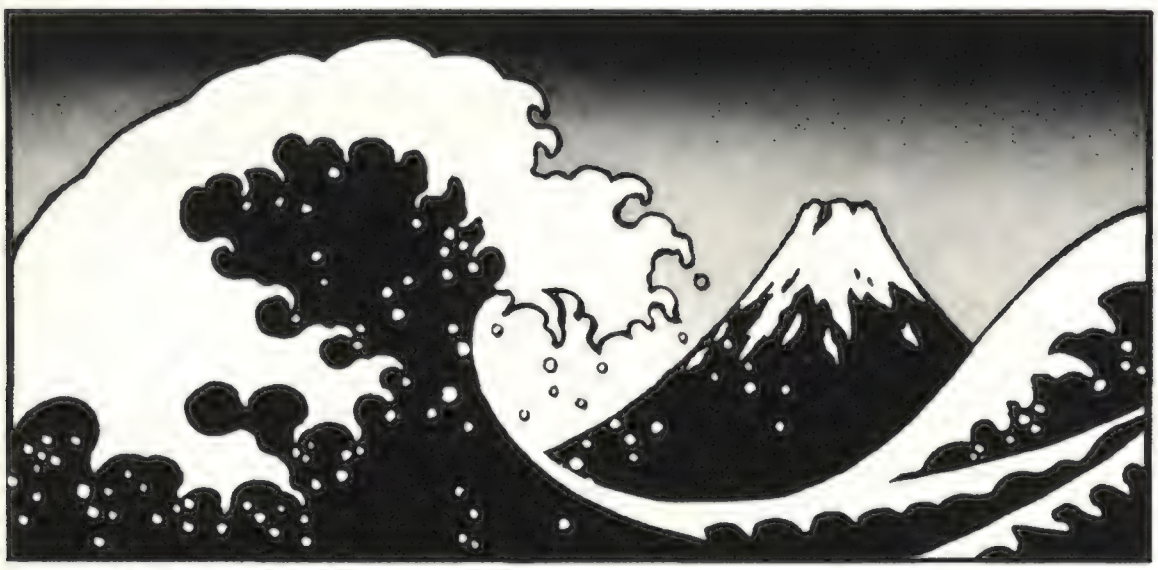

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Hazardous conservation

The more scientists peer at the accouterments of what we call Western Civilization, the more they find things about it that are bad for people. The latest has to do with energy. In response to *that* old crisis, growing numbers of people are insulating their homes—a good thing, you would agree.

Perhaps not. The problem, if there really is one, starts with uranium 238 which, as it decays, produces radium 226 which produces a gas called radon 222 which in turn produces two forms of polonium (218 and 214), and these can attach themselves to airborne particles. If you inhale the airborne particles, they lodge in your lungs and emit alpha radiation into those organs' tissues and that, as uranium miners have found to their distress, can cause lung cancer.

But radium 226 is present in small traces in most rocks and soil, and thus in many building materials, such as brick, cinder block or concrete. And scientists at the University of California's Lawrence Berkeley Laboratory now opine that the loss of ventilation in certain well-insulated houses may increase the inhabitants' exposure to this nasty stuff, leading possibly to an extra 20 to 200 annual deaths per million people from lung cancer. All speculation, to be sure.

But sooner or later, we are told, building standards may include an allowable radon-exposure level along with our old friends the pipe diameter, the wire gauge and the test strength of concrete.

In this business of civilization, the odds, as computed by Sam the Gonif, are indeed six to five against.

—James K. Page jr.

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COURVOISIER VSOP. THE BRANDY OF NAPOLEON

Those who chart our vast lands explore vital new frontiers

At the age of 100, the U.S. Geological Survey is an unbiased—and sometimes uneasy—guide in the nation's rush for more resources

By P.F. Kluge

In 1880 Survey artist William H. Holmes made field sketches for this sweeping panorama of the Grand Canyon as seen from Point Sublime on the North Rim.

In the period of Western expansion following the Civil War, the federal government came to recognize the vast extent of the nation's public domain and the need for evaluating it in a systematic way. Thus, 100 years ago this month, President Rutherford B. Hayes signed a bill creating within the Department of the Interior a unique agency: the U.S. Geological Survey.

From the outset it was an organization of scientist explorers who probed the farthest reaches of the wilderness, piecing together the continent's geology, defining its landforms and translating its topography into accurate maps. The Survey's men hauled their instruments to the tops of mountains, its photographers wrestled with bulky wet-plate cameras and its artists labored over meticulous geologic panoramas, like the one at left, whose beauty often transcended their documentary purpose. The Survey's reports, maps and pictures provided the basic understanding necessary for mining, agriculture and other human endeavors to proceed.

The Survey's first leaders were men as much at home beside wilderness campfires as in the parlors of Washington. Clarence King, the first director, was a multifaceted scientist, author, raconteur and administrator who, at the age of 25, had convinced Congress to establish the first geological exploration of the 40th Parallel. He was succeeded by John Wesley Powell, a self-taught naturalist and Union Army major whose loss of a forearm at Shiloh had not prevented him from carrying out a daring exploration of the Grand Canyon in 1869. Powell, director from 1881 to 1894, was simultaneously the director of the Smithsonian's Bureau of American Ethnology. Thus began a working relationship between the Survey and the Institution (see Secretary Ripley's comments, p. 8) which has continued to the present day. Men like King, Powell and their colleagues established the Survey's traditions: scholarship, integrity, freedom.

Today, on its centennial, the Survey, still an agency within the Department of Interior, is as likely to rely on photographs produced by satellites (pp. 43-45) as on the efforts of earthbound explorers, but its traditions remain intact. This is a proud, professional outfit, and a visitor to the Survey's headquarters in Reston, Virginia, or to its field offices around the country, encounters the sort of spirit one would expect in a crack military unit. "Go walk the hallways of any other government department," is the challenge of one youthful Survey staff member. "You'll find people taking two-to-three-hour lunches, some people who

(Text continued on p. 46)

P. F. Kluge, a former Life *correspondent, toured the country with Survey personnel. Kluge's recent novel,* The Day That I Die, *is set in Micronesia.*

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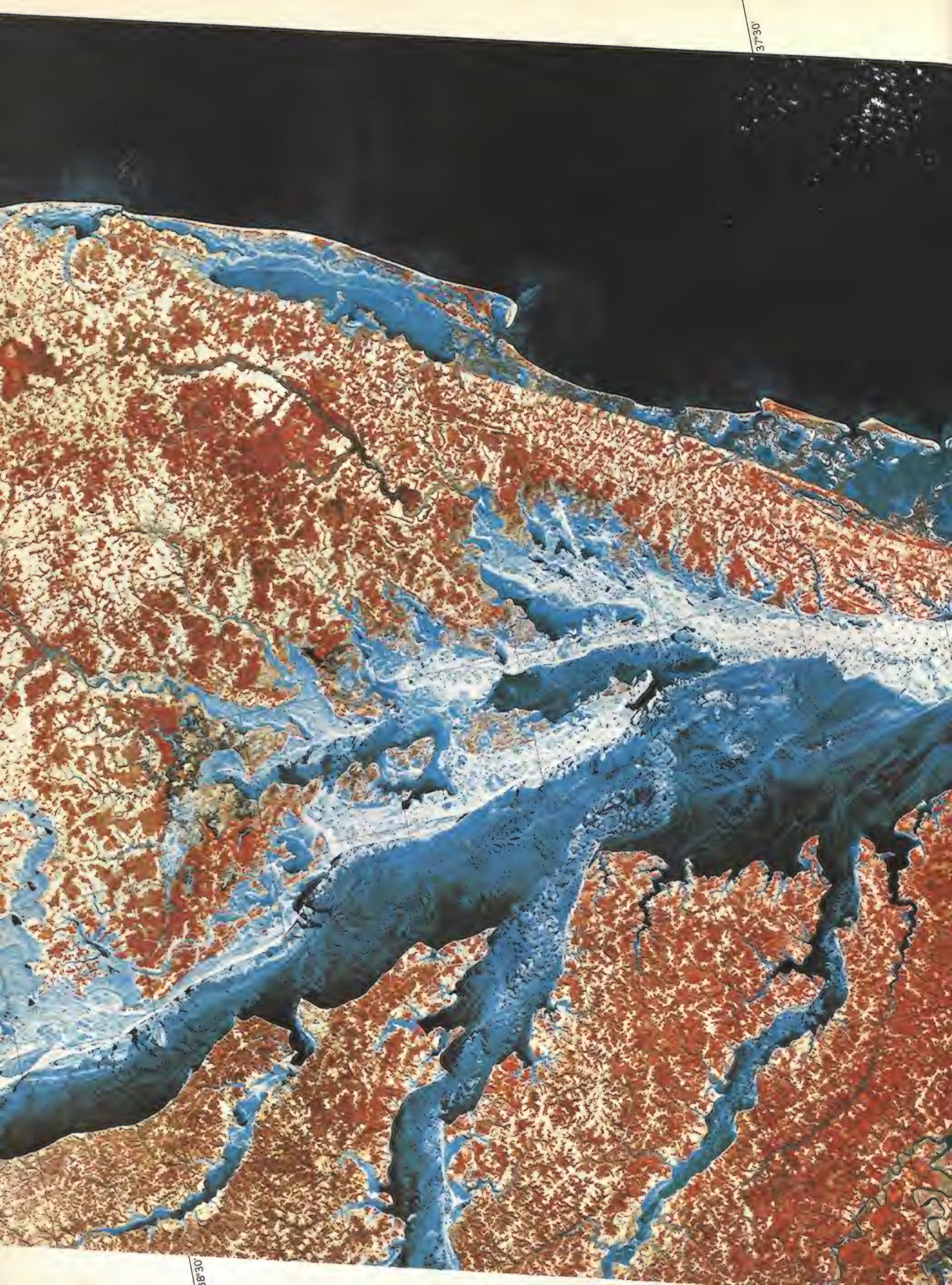
39°30'


37°30'
38°30'

Topographic Division, United States Geological Survey

A cartographic portrait of a fearsome winter—from 569 miles up

This modern USGS map shows how far cartographic technology has come since Survey map makers painstakingly drew contour lines with pen and ink. The map, made from a series of photographs taken by a NASA "Landsat" satellite 569 miles above the Earth, shows a 210-mile stretch of the mid-Atlantic coast during the fierce winter of 1976-77, when Chesapeake Bay froze over. The value of such a map is its permanent record, in an accurate scale, of a passing, short-term phenomenon.

To the west of the arrowhead-shaped Delmarva Peninsula lies ice-choked Chesapeake Bay. The large river entering the Bay from left below 38°30′ is the Potomac. Above it is the Patuxent; below it, from north to south, are the Rappahannock, York and James rivers. In the Bay, old, thick ice is white, while newer ice appears bluish green. Open water is almost black, and white snow blankets the ground at the northwest end of the Peninsula. Infrared film, used to penetrate haze, renders evergreen forests and winter crops in red, areas of urban development in green and dormant vegetation in light green to white. At upper right, strip ice is visible drifting from the mouth of Delaware Bay. Clouds form white spots at lower right.

are working one day out of five. Come here and it's the difference between night and day."

The Survey's workload increases every year. It maps continents, planets, sea bottoms. It frets about landslides and earthquakes, it monitors volcanoes and glaciers. It inventories minerals, tests water, studies climate, and evaluates the resource potential of the sea (it is perhaps no accident that the Survey's newest director, Dr. H. William Menard, is a research marine geologist and oceanographer). It supervises the drilling of oil, the mining of coal. Its publications range from learned treatises on nuclear-waste disposal to critiques of dowsing rods to advice on starting rock collections.

Still, along with its traditions, a history which ranges in effect from *The Winning of the West* to *Star Trek,* there is some concern about the Survey. Mere growth is itself a worry: the Survey's budget today exceeds $640 million and its permanent staff numbers 13,000. But there are further doubts about the changing nature of the Survey's mission and, especially, its response to the energy crisis. One hears it put a number of ways: research yielding to mere report writing, free inquiry pressured by budgets and deadlines, old-line scholars forced to make room for people they consider "cops" and "plumbers." Random visits with Survey people across the country suggest that this unique and colorful organization has much to celebrate. And something to worry about as well.

One can begin with a man like King Huber. "Geology," says Huber, "is what the world is all about. It'll take two things for Man to survive on Earth: food and energy. And geology will have a lot to do with finding enough of both of them."

King Huber is a geologist, part of the science, the division and the tradition that remain at the heart of the USGS. Regarded with admiration and envy, the Survey's Geological Division is noted for its elite, scholarly aura, its numerous university connections, its attachment to pure research, its apparent leisure—what one outsider gently calls "a less compelling sense of urgency about the completion of projects."

On a day in midsummer, King Huber pitches his tent in a campsite in the national forest just north of Yosemite. He has come to work, come for the whole summer, his 12th such summer in the Sierras.

A trim, bearded 53-year-old, Huber could pass for a prospector. He wears sturdy hiking shoes, jeans, an old shirt and a cowboy hat. His belt has an oversize centennial buckle inscribed "United States Geological Survey" and a second belt looks something like a gunslinger's holster, with compartments for hammer, compass, notebook and pencils. Around his neck, like a crucifix, he wears a hand lens for close scrutiny of rock samples.

Huber's mission is to prepare a geological map of a 12-by-15-mile area known as the Pinecrest quadrangle. The mapping is part of a larger effort to inventory and evaluate Western mineral resources. The scramble for vital commodities is reaching into the mountains and Huber has enlisted in the hunt. He's not alone. Other geologists are probing other quadrangles, and airplanes with magnetometers and Geiger counters will be scanning for iron and uranium.

The Pinecrest quadrangle attracted Huber because it was the area about which least was known—the "biggest hole" on existing maps of the area. That challenged King Huber. "You feel like it's your land after you map it," he says.

On his first day in the field he drives up logging

In 1883, Survey geologist Arnold Hague gathered data on cone of Lone Star Geyser in Yellowstone Park.

On Bourland Mountain in western Sierra Nevada, King Huber and field assistant Barbara John examine aerial photographs with a stereoscope. They are making geological map of an area of 180 square miles.

trails to a rocky hillside known as Dodge Ridge. Stopping for lunch in a grassy meadow bordered by fir trees, he can see all his summer in front of him. In the distance, the peaks of Yosemite are still mantled in deep snow; even after the thaw, he'll need horses and mules to reach the high country. To the east are rocky, barren ridges, a tangled mass of glacial boulders, volcanic mudflows, granite sheets whose stratigraphy, borders and composition will take weeks to untangle. The terrain to the west is frustrating: a hilly, heavily forested region almost devoid of rock outcrops. Here, Huber predicts, he'll be forced to wade into streams like a gold panner (pp. 48-49), relying on sediment samples for clues about the geology.

"The chance of significant discovery is very low here," Huber admits. "This area has been prospected for a hundred years. If something were obvious, it would already have been found."

The current search for minerals is the immediate rationale for his project, but the geological history of the Sierras is his lifelong concern. "This isn't just an opportunity to explore for minerals," he explains, "but to upgrade the geologic knowledge of the area. That way, when a new way of exploring, a new concept comes along, the basic geology is there."

Some summers, when he hasn't worked in the Sierras, he has vacationed there, showing his family some of the fine and secret places he has discovered. A recycler of cans, a bird watcher and botanist, a member of the Sierra Club from the time when it was "still just a hiking club," King Huber counts himself fortunate to have spent so much time in the mountains. What, then, if he made a discovery? Unlikely, true, but what if a patch of red-stained granite betrayed iron, and iron was accompanied by zinc, lead, copper? What if some white-bleached volcanic rock signaled deposits of silver? What if his work triggered an enormous transformation in the mountains he loves?

"You have to have mixed feelings," Huber admits. "You love the outdoors and you'd hate to see it destroyed, but you know a certain amount of destruction is going to be necessary if we're going to maintain our standard of living. As scientists, as members of the Survey, we have to be extraordinarily objective. We have to point it out, say it's there, and let the chips fall where they may."

There may not be time or money for more than a preliminary geological map of Pinecrest. That, too, inspires mixed feelings. "Recently, there's been an increased emphasis on applied work, specific mission-oriented work rather than pure research," he observes. "In the past, the Survey had a larger part in determining its goals and missions than it does now."

Still, for now, for this recent summer, for the foreseeable future, his work in the mountains is enough like it has always been for King Huber to be happy. At night he enjoys sitting around a campfire, nursing a Scotch. He leans back in his chair, tilting his head

Like old-time prospectors, Huber and John pan sediments of Jawbone Creek in the Sierras. They are

toward the sky. Night after night, his comment is the same, but he always makes it sound like a piece of fresh news.

"It's momentous," he says. "You look up and see there are actually stars up there. A bunch."

It's hard to picture a man like King Huber in a place like Atlantic City. But this is what Bruce Wamsley, district supervisor for the Mid-Atlantic District of the Survey's Conservation Division office there, calls a "frontier area." About 90 miles east of the Boardwalk, out in the ocean, a game of chance is being played, and the stakes could beggar any of the payoffs in Atlantic City's new casino world. On a muggy morning last summer, even while Wamsley was explaining what the Geological Survey was doing in the town that gave the world Monopoly, six drilling rigs hovered over the Baltimore Canyon trough, testing some of the 93 offshore leases for which oil companies paid the U.S. government more than $1.1 billion.

"I don't know what's out there," Wamsley says. "It's not going to be another Saudi Arabia. But it could be a help. You never know until you drill. It could be a bonanza. It could be dry."

Official estimates are that there might be as much as 870 million barrels of oil and 11 trillion cubic feet of natural gas out beyond the Steel Pier, and Bruce Wamsley and his staff are hoping that the oil companies' gamble will pay off. But hoping for winners isn't their job. They make sure the game is played by the rules. And the rules are strict.

In Atlantic City, the Survey teams oversee exploration, drilling permits, environmental analyses. They police drilling rigs. Armed with five-page checklists, Survey inspectors monitor all phases of rig operation—waste disposal, mud programs, drilling methods, blowout precautions. If they are displeased with what they find, they can issue warnings. That's happened about 15 times already. If they are very displeased, they can shut down a rig. That's happened only once so far.

"We're nitpickers," Wamsley concedes. "We're out there every day. If some machine's dripping oil into the ocean—maybe it's just seven or eight gallons a day—that might be a small thing to an oil company. But it's a big thing to us.

"I guess if you asked the oil companies, they'd say no, they don't need us. But I guarantee you, without us there'd be more pollution. No matter how you look at it, the bottom line is that an oil company is concerned with economics. Without us, they wouldn't have as much safety equipment, as much backup equipment, as much testing and training. We require eight safety packs—oxygen tanks and masks—to protect the drilling crew if they should hit a pocket of hydrogen sulfide gas. Now, one of the companies bought extra suits—enough for everybody on the rig. Another company complained about buying just eight suits. But if they hit hydrogen sulfide, within two minutes everyone on the rig floor could be dead."

The Geological Survey people who police offshore drilling don't hide their sympathies for the oil companies. Wamsley readily reels off a list of all the ob-

not seeking gold, but samples of any heavy metals, which will be sent to a lab for spectrographic analysis.

stacles facing offshore prospectors—costs of leasing, exploring, building, producing and shipping, court fights, high risk of failure. "Barges dump garbage, New York City dumps raw sewage, passing ships evidently blow their bilge into the open seas," he comments, "but an oil company can't flush a toilet on a rig unless it goes into a septic system." Despite their sympathies, though, they enforce the laws.

Bruce Wamsley and his inspection staff are regulators. Law enforcers. *Cops*. And, even though good cops, there's some question about whether they should be part of an outfit which built its reputation on map making, research, fact-finding. ("Our position ought to be to advise, not enforce," one critic remarks.)

Some of this may be intramural sniping. As a result of Santa Barbara, the Arab embargo, heightened pressure on Rocky Mountain coal and offshore oil, the Conservation Division has recently outpaced the Survey's other departments in terms of growth. Still, more than one brow furrows at the thought of helicopter-borne Survey staffers pulling blitzkrieg inspections.

"We're happy to be part of the Survey and believe we should remain a part of it," replies Hillary Oden, associate chief of the Conservation Division. "What's the old saying? Any scientist can design a plumbing system but it takes a plumber to make it work. We try to be the best plumbers possible."

Nobody would call Farrel Branson a plumber. As he drives a brown Dodge across the windy, wide-open plains of southeast Wyoming, Branson watches a dozen antelope flee across the sagebrush and says, "I've tried everything with antelope. I've smoked them. I've made sausage out of them. I've barbecued them. Every way. They're the worst. Buffalo's the best of all, but it's still not as good as a piece of beefsteak."

Branson and his partner, Lynn Shown, are the very image of classic USGS field workers. Branson, tall and balding, is a botanist (p. 50). His partner is a hydrologist. Together they have nearly half a century of experience. Yet their work is changing: the Survey that employs them today makes different demands from the organization they joined.

A time for "quick-and-dirty" studies

Branson and Shown once belonged to "Soil and Moisture," then a small program in the Survey's Water Resources Division. They specialized in research on the effects of grazing, on the conversion of sagebrush and piñon-juniper country to grassland—in short, on the effects of land-treatment practices on the public domain. Their studies went on for five and ten years; they asked the questions and they answered them. Their deadlines were self-imposed.

Soil and Moisture no longer exists. Renamed "Public Lands Hydrology," it has shifted from research to reconnaissance, from ten-year studies to one-year "quick-and-dirty" assignments, from studies of forage-and-water relationships and erosion control to studies of one thing only: coal. Two-thirds of America's coal lies beneath the prairies and tablelands of the West. Branson and Shown now spend their time figuring out what kinds of vegetation are on the surface and what should be done after the coal has been extracted by strip mining.

Today's destination is the "Hanna Basin Study Site." Every year, the Bureau of Land Management presents a list of "hot areas" which may soon be leased for coal mining. With some partial, painful exceptions, the Survey clings to its reputation as a non-policymaking factfinder. So Branson and Shown—and their bosses—have nothing to say about whether a place will, or should, be mined: they have opinions, but the U.S. Geological Survey is famous for keeping its opinions out of its reports. Branson and Shown are required to appraise an area, inventory its plant and animal life, its soil and water, before the draglines and bulldozers arrive. Why bother? Dick Hadley, their supervisor, responds: "You hear so much talk from environmen-

talists, and from people who don't know much about the environment, who say 'we're opposed to mining because it deteriorates the water and it causes erosion.' Well, unless you have some kind of baseline data, you'll never be able to prove whether it's better or worse than before. The baseline data are more or less a yardstick on which reclamation can be evaluated."

Nearing the site, Branson and Shown evaluate some reclamation that's already been done. Passing open pits, piles of coal, mile-long mountain ranges of raw, ungraded soil, they come into a region of hills and valleys, tentatively green. They walk the area, pondering grade slopes, distances between furrows, contouring styles, approaches to revegetation. Some places are well on their way to becoming green and pleasant hillsides. Others are torn by gullies and captured by soil-destroying weeds.

"They're trying, they're doing a better job every year," Branson remarks as charitably as possible. "The best reclamation I've seen is in Germany. They know what crops to grow, how to fertilize, what the right soil texture is, how much rock to put in if they're going to have tree stands instead of cropland."

Finally, the 2,400-acre site is in front of them, a semiarid desert rolling toward a range of distant mountains. The botanist goes first, scanning the cover. Only 14 inches of rain a year—sometimes less—reach these plains and the vegetative results seem nondescript, with no true grassland, no real trees, nothing taller than a waist-high greasewood bush. But Branson reads it like a book, and finds remarkable variety. A good stand of sagebrush indicates fairly abundant moisture, and soil that might be saved for reclamation. Greasewood betrays unsuitably salty soil. Nuttall saltbush—among the most tenacious, drought-resistant plants—also sits atop soil that need not be stockpiled for use in reclamation. Elsewhere, Branson finds snakeweed, pepperweed, needle-and-thread grass.

With care, the Hanna Basin site can be reclaimed, Branson believes, but the natural diversity of plant life may take a long, long time to be restored. "I don't think you could find seeds for everything that grew here once, even if you wanted to."

While Branson surveys plant life, hydrologist Shown takes in the lay of the land. Most of it is gentle and rolling, with little natural erosion. But at the northern end of the site, it convulses into barren sandstone hillsides, sharp gullies, ruinous streambeds. Here, Shown suggests, is an area that could be improved by reclamation. "There's nothing on the sur-

In study that will help land reclamation, botanist Farrel Branson takes core sample of pine in Montana.

To find out how mining affects air quality, Survey scientist sends aloft a data-gathering balloon.

With assistant Ian Epstein (left), Branson uses a "point frame" to measure abundance of vegetation.

To help evaluate water resources, a USGS researcher checks precipitation on Gulkana Glacier, Alaska.

face now that makes good soil. If they brought in alluvial soil or overburden there could be much more forage and productive plant life."

So they drive and walk the site, putting together findings, warnings, recommendations about a landscape soon to be transformed. Usually, it takes several weeks to complete their field reconnaissance, and then it's back to the office or on to another site in their "territory," which includes, besides Wyoming, New Mexico, Utah, Colorado, North Dakota, Oklahoma and Montana. It's a schedule that leaves little room for research and both men regret it. They talk wistfully of pet projects. Intrigued by desert plants, Branson experiments with their strength, their ability to pull water out of the soil and hold it. Shown had some ideas about "channel geometry," a method of estimating runoff from ungauged watersheds. Such research doesn't have priority now.

"I have no doubts about the importance of this study-site work," Branson confides. "This is service, information gathering. It's just that after you've been doing research, this doesn't look very exciting. Research gets into your blood. It's a delight, following out one variable as it affects another. This isn't that kind of work."

"It's what brings home the groceries," Shown says.

Bringing home the groceries—yes. That's the meaning of the time bomb sitting in the ground-floor lobby of the U.S. Geological Survey's Reston, Virginia, headquarters. It ticks away quietly, around-the-clock, surrounded by paintings, map displays, rock collections and science-fair exhibits with which the 100-year-old Survey lines its halls.

Visitors pause, staff members shuffle by. The time bomb is a tote board, a bank of six contraptions that look remarkably like gasoline pumps, with speeding digits recording the amounts pumped. But more than gas is involved. Each pump registers the current rate at which Americans are using—using up—one of six vital commodities. A visitor could stand there and watch them whirling away by the tons, cubic meters, barrels: iron, aluminum, copper, sand and gravel, mineral fuel, water. It's like listening to the ticking of a clock, or to a stethoscope placed against one's own heart. And the tote board is a pretty good indication that the Survey's second century will be much different from its first.

Maps were a perfect symbol for the Survey's first hundred years: impartial, factual, richly detailed portrayals of America. Instruments of discovery. But now the discovery is turning into a hunt, a search, a scramble. The Survey's work is more pointed, pragmatic and deadline-oriented than ever. The tote board in the lobby is the symbol for the second century.

There's a sense of urgency in the Survey now. To be sure, there have been crises before. But this time the crisis is wide, deep—and probably permanent. "We can't afford to spend 15 years mapping a quadrangle," insists one administrator, "not when we have to lease it in six months. If you wait till you have all the data, the decision is made and the data comes in 15 years later."

Much of this change is inevitable, but that doesn't mean one has to like it. "We feel we should be telling other agencies what they need," muses one old-timer. "Instead they're telling us what they need. For example, a big housing development might be going in on a potentially dangerous site. They ask us: 'How dangerous? What can we do?' We say, 'Give us three years.' They say, 'The permit's good for a month.' So we pull something together, but it's based on information we already have rather than new research. It's as if we were spending capital we'd already accumulated, rather than earning more."

"This used to be a prestigious old-line bureau," reflects William A. Radlinski, the Survey's associate director. "We didn't make many waves. Our reputation rested on the quality of our scientific work. And our maps: 'Oh, you're the people who make those nice maps.' Today we're best known for the results of regulatory responsibilities many of the people in the Survey didn't even know we had. Extraction of minerals from public lands is an enormous responsibility. Offshore work is highly visible. The public is worried about its impact. We have a big problem establishing credibility. We want all of our work to be as highly regarded as our maps and scientific reports."

Survey volcanologist probes Halemaumau Crater, Kilauea Volcano, Hawaii, recording lava temperature.

THE AUDI 5000 HAS BEEN AS THE BEST LUXURY-SPORTS SEDAN

To be singled out by ROAD & TRACK as one of the "10 Best Cars for a Changed World, 1978" is no small honor. This is not an annual affair, as you will note from these observations in their June 1978 issue:

"Times change. People change. Priorities change. Cars change. That in a few words is the rationale behind this list of Ten Best Cars. The last time the R&T editorial staff thought the time was right for selecting a Best Cars list was exactly three years ago. And before then you have to go back to August 1971—nearly seven years ago..."

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By Paul O'Neil

Folk heroics of rodeo have become organized, mechanized—and profitable

Riders can reach the top through little leagues and a walleyed bucking machine, but it's still a ritual of man and beast

Photographs by Jonathan Wright

Tying up a calf as his horse holds the rope taut, champion Tom Ferguson practices until after dark at his Miami, Oklahoma, home. He began roping eight calves a night when he was a high school cowboy.

Rodeo grounds differ. Some are floodlit indoor arenas. Some are still dirt fields flanked by sun-bleached grandstands. But broncs with names like Midnight Black and Widow Maker create menacing echoes in Pendleton as in Oklahoma City when they rear and kick in imprisoning wooden chutes. Riders in big hats ease down on their backs with exactly the same fatalistic caution in Cheyenne as in Ellensburg or Calgary. And every crowd breathes tension: to be broken in seconds by disaster—as when a horse named Bay Beggar threw Deb Copenhaver in one celebrated spill and kicked him in the face as he hung from one stirrup—or by the kind of wild triumph a man reflects while surviving with grace on a beast gone mad.

Men who herded longhorns up the Chisholm Trail gave little thought to the future; by the same token, today's rodeo cowboys waste no time in contemplating the past folklore on which their profession is based. They cling stubbornly to this bruising and exhausting way of life for exactly the reasons the mountain men, prospectors and line riders of the Old West clung to theirs: pride in their own hardihood, a kind of veiled contempt for stay-at-homes with regular jobs and regular lives, the hope of striking it rich (though only a small percentage of performers make big money) and the stimulation of danger and suspense. They may dream of magenta-colored Cadillacs and use jet planes or campers to jump from arena to arena, but they are

the same hard and hopeful breed of men for all that: footloose by necessity, reckless, ruefully philosophical, contemptuous of pain, taciturn, even shy.

Early rodeos seemed like home to men with such attitudes, and they happily risked their necks, often for little more than enough money to reach the next town, fairground, ball park, pasture or stockyard, wherever local merchants would put up the prize money. But in the last two decades the rodeo has emerged as a major national way of life. There were 618 rodeos in the United States during 1978—shows blessed, at any rate, by the Professional Rodeo Cowboys Association—and scores of smaller, unsanctioned exhibitions as well. They drew 16.5 million paying customers, distributed $7.2 million in prize money and made it possible for Tom Ferguson, a calf roper and steer wrestler, to become the first cowboy in history to earn more than $100,000 in 12 months—which he has done for the last three years. And feminist ferment has prompted a Girls Rodeo Association whose members risk their necks on broncs and bulls as stoically as men: spectators at the Spring Creek, Nevada, Horse Palace saw cowgirl Sue Pirtle Hayes ride a bucking horse while eight months pregnant during a recent world's championship show, and saw Karen Christianson carried off unconscious with a broken cheekbone after being thrown by a Brahman bull.

What's more, 3,000 college students roped and rode in 100 intercollegiate rodeos, and 15,000 high school kids from 29 states and two Canadian provinces competed in 326 interscholastic contests. Rodeo even boasts a Little League—in this case called Little Britches—

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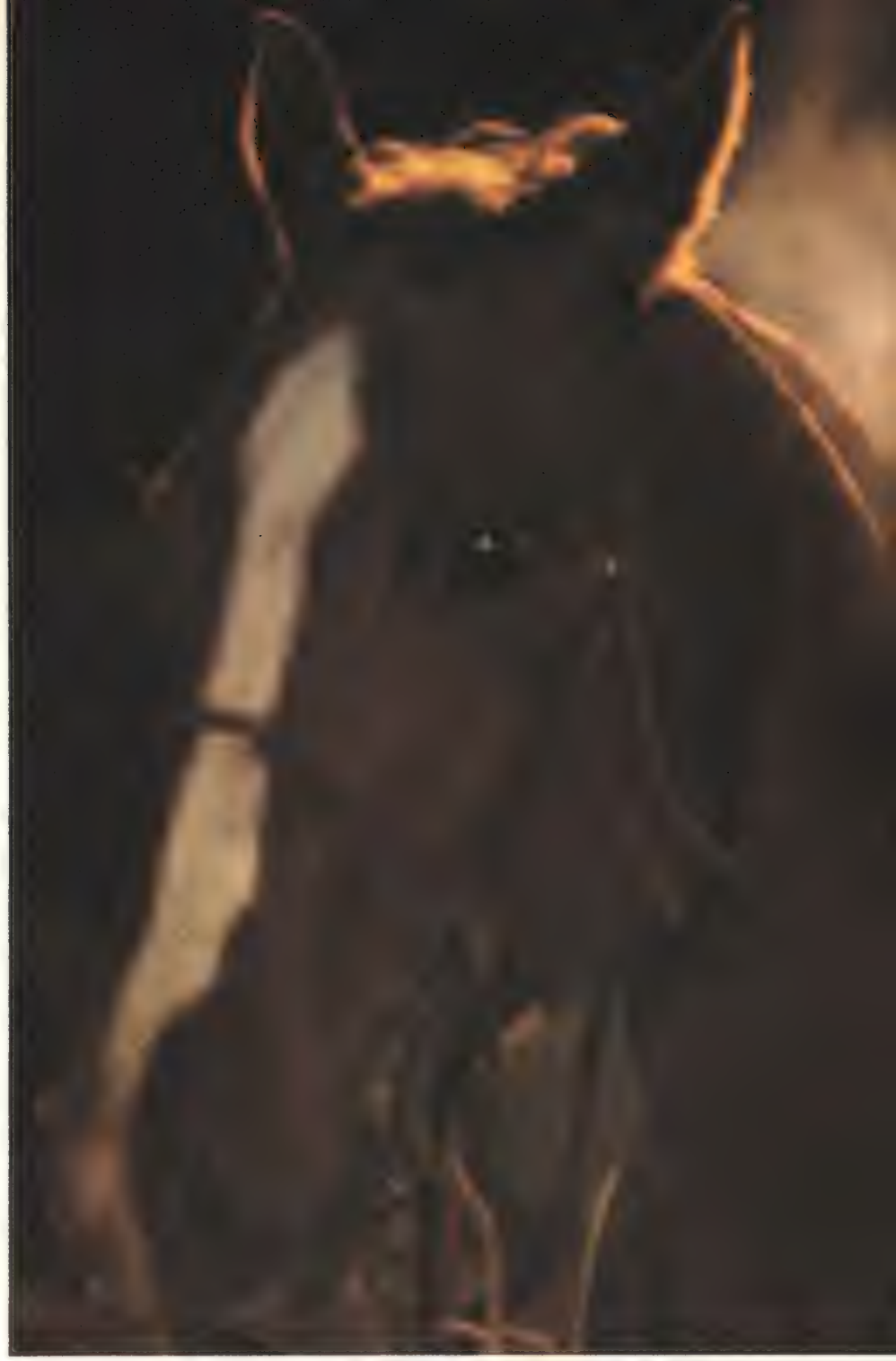

Lasso slung across his shoulder, Ferguson heads his steaming horse Sonny Boy toward the barn.

After a tough practice session, Ferguson naps bareback as his horse obligingly soaks sore legs in a stream.

Bedded down as his wife Debbie drives, Ferguson heads for the next rodeo in his $32,000 truck and trailer.

Ferguson digs his heels in as he wrestles a headstrong steer at home, upending it in just a few seconds.

with 16,000 boys and girls from 8 to 18 entered in 80 little rodeos of their own.

The modern rodeo subjects a performer to pressures the old working cowboy never knew. He must not only submit his body to constant abuse, since he must compete in as many shows as possible in pursuit of purses, but must also travel hundreds, even thousands, of miles in getting from arena to arena and must keep doing so for months at a time.

The cowboy compensates for the aches, tension and sleeplessness of his life as best he can. He puts his faith in pills in many cases: keep-awake pills (hummers) on long drives, pain pills (Darvon or codeine if he can get them, aspirin if he cannot) to help him ignore bruises, torn ligaments or dislocated joints. Some gulp vitamin tablets and hope for magical results; some carry exercise equipment; some read books on positive thinking. They encase themselves in yards

Modernized ritual of rodeo

David Cupp

Fledgling cowboy competes in a goat tail-tying contest at a Little Britches rodeo in Cedaredge, Colorado.

and yards of adhesive tape or vast wrappings of Ace bandage, partly to compensate for damage already suffered and partly as a kind of ritual calculated to protect them against bad luck or a bad ride as well as new wounds or broken bones.

But if most cowboys seek comfort in pills and portents, rodeo's superstars—and there have been very few of them—seem to have been men with a much more direct approach to the imponderables of the arena. They have disregarded the tensions and risks of their calling and achieved a consistency of performance that could only have stemmed from some inner wells of unusual self-confidence. So has their lineal descendant, Tom Ferguson of Miami, Oklahoma, who burst into the news as professional rodeo's second biggest money winner while competing part-time as a college senior in 1973, became the first to top $100,000 (with a total of $114,110) in 1976, and has reigned since as the most brilliant of a new breed of cowboy.

Ferguson is a handsome young man—dark-haired, unassuming and now in his middle twenties—who sits a horse like a medieval prince: exactly the kind of target that attracts camp followers and fast-buck artists to the periphery of his world. But he has weathered adulation and sudden liquidity as well as the rigors of his calling with remarkable aplomb. He is a gifted athlete, especially adept at steer wrestling in which a man on a horse bursts out after a racing horned beast, leaves the saddle and deposits his quarry motionless on the ground—in less than five seconds if he expects to share in the prize money. Most steer wrestlers are bigger than he—he is 5 feet, 11 inches tall and weighs 180 pounds—but he possesses reflexes which not only make him a marksman with a rope but allow him to upend a 700-pound steer with alacrity. He puts his faith in method and conditioning rather than in heroics, seems too intent on his craft to be aware of temptation (he neither drinks nor smokes), sees no sensible reason for failure and accepts big purses like a banker stowing away returns on a loan.

The eminent roper and his wife, Debbie, a California girl he met in college, live simply when at home —they began with a house trailer and now rent a tiny bungalow for $100 a month. But Ferguson has spent $23,000 for a yachtlike, custom-built trailer in which to camp on the road, and another $9,000 for a dual-wheeled truck to provide it with high-speed motive power. This elegant conveyance not only boasts its own water supply (linked to a water purification system), a bathroom with shower, comfortable beds, air conditioning, a kitchen with refrigerator, and a generator which supplies its own electricity, but storage space for saddles, bridles and ropes and a rear stable area for three horses and their feed.

Ferguson drives 70,000 miles a year and lives the same, indescribably hectic life as his colleagues, trailer or not, once he sets out on the circuit. Most cowboys assume that they must enter at least 100 rodeos a year if they expect to make real money—Ferguson tries to hit 120 of them—and this involves competing simultaneously in two, or sometimes three, rodeos if geography and the time factor make it possible. Ferguson was seldom able to sleep more than three or four hours in 24, for instance, in one recent assault on arenas in the Northwest.

He pulled out of Miami on Sunday of the week before Labor Day with his wife at his side and two horses in the trailer's rear compartment, and arrived in Salem, Oregon—more than 2,700 miles away—at five o'clock the next Tuesday morning, having stopped only for food and fuel. His prized roping horse wisely

David Cupp

One arm high, a Little Britches entrant plunges into arena clinging to saddle of a scaled-down bronc.

James Fain

Saddle-bronc rider is bucked off his mount in 1978 National High School finals in Huron, South Dakota.

reclined in a stall on arrival at the Salem rodeo grounds, and Ferguson slept until noon. But not much thereafter: he was "up" at Salem that afternoon; at Walla Walla, Washington, on Thursday; at Salem again on Thursday night; at Ellensburg, Washington, on Friday morning; at Pueblo, Colorado, that same night—and had to repeat at most of the same towns, plus another in Idaho, over the long weekend.

His wife was able to intercept him with the trailer a few times during this frantic game of leapfrog, but during most of it he was forced to abandon her and his horses while hitching rides with friends and using borrowed mounts at outlying arenas. He chartered planes twice to get to Seattle, caught commercial flights to Denver twice, and drove on to Pueblo in rented cars with two other cowboys who were also entered there: starting from Ellensburg on Friday (after competing there earlier in the day) and from Yakima, Washington, on Monday (after competing twice on Sunday), driving all night, and competing again shortly before taking off.

"We barely made it both times. We knew we were late Monday night; we left Denver driving 90 miles an hour and had a blowout. We got the car stopped but there were big pieces of rubber all over the road, and just as we got out another car came over a rise behind us and came screeching and sliding past us and slid off the road and crashed into a tree. We knew the guy was all right—he jumped out and came running over to write down our license number—so we put on another wheel and got out of there." Ferguson slept—at last—after the rodeo on Monday night, flew to Twin Falls the next day and ended the expedition with a last performance at Filer, Idaho, where his wife, having driven some 600 miles in the interim, awaited him.

This concentration and disregard of exhaustion paid him handsomely in the Northwest—$7,600 in just seven days—a figure interpreted as a measure of valor and worth as well as gain by the inhabitants of his violent and demanding world.

The world of rodeo in which the new breed of cowboy finds himself, often after having got a college education, is one that would have left drifters from the open range dumbfounded—not only because of the millions now available in prizes, but also because of the trappings now endemic to the sport and the supernumeraries and peripheral enterprises that have attached themselves to it over the years. Not the least of these are the teachers it has inspired.

Early bronc riders practiced on homemade "bucking barrels"—kegs hung from ceilings or tree limbs by ropes or springs and yanked about by whooping colleagues or perspiring relatives and friends. Ex-rodeo champ Jim Shoulders improved on this rude concept by connecting an oil drum to the universal joint of a partially dismantled automobile, and activated it by throwing the car's gearshift lever from low to reverse and back again. Today's young cowboys can improve their skills in seminars and schools that employ more sophisticated technology. One inventor, Joe D. Turner of Corrales, New Mexico, has sold hundreds of his electric bucking machines, known as the El Toro, to colleges, schools and rodeo clubs across the country. And a tall Texan named Sam Reeves has duplicated the motions of a bucking horse or a rodeo bull in a machine he calls the Gold Nugget Rider Trainer: a fiber glass beast with walleyes and one stationary metal leg, which can unseat the aspiring bronc tamer as

El Toro bucking machine administers barnyard lesson in bronc riding to Oklahoma cowboy-in-training.

peremptorily as any rodeo outlaw of the fabled past. "Rodeo cowboys keep movies of their rides on different animals," he explains; "I looked at hundreds of them when I was developing the trainers, and I'm about to hook them to a computer which can be programmed to make them buck like any horse or bull you want to imitate. There's no point in getting on a machine that jumps one way and then getting on an animal that has different habits."

High school and college rodeoers have only to buy *Rodeo News,* the official publication of the International Rodeo Association, to find ads for clinics conducted by men who have won at Pendleton, Calgary and Cheyenne. Ex-all-around cowboy champion Larry Mahan puts students on real broncs—explaining, ominously, that the animal neither knows nor cares that the rider is a neophyte—but prepares them for the subsequent rites of passage by shouting, "Positive mental attitude! PMA! Tell yourself there's no such thing as a negative thought!" Champion bull rider Gary Leffew—a student of Zen—sent one pair of aspirants into the California hills to commune with themselves for weeks, like young Indian braves, before consenting to instruct them in his dangerous trade.

But none of this has diluted the rigors of the arena itself, nor alleviated the danger, tension and exhaustion which have been the lot of the rodeo cowboy since his beginnings. An old-timer who, when he was 13, watched the storied bucking horse Tipperary at Belle Fourche, South Dakota, still remembers the performance. "That red horse," he said, "could buck into every possible position. He'd leap sideways, he'd fall backwards, he'd jump straight into the air and twist until his belly looked straight up at the sky and all four legs would be flailing the air. Oh, he was fast."

Modern cowboys take the punishment in stride. Here is Casey Tibbs, a rodeo champion of the 1950s, describing his peerless ability to commune with the plunging monsters which bore him—legs flailing, one arm high—into the arena: "You just fall into the rhythm and it's just like dancing with a girl."

There is no telling when the first rodeo—not then so formally named—was held, although one legend places it at Deer Trail, Colorado, some time in the late 1870s, and identifies the contestants as cowhands of the Hashknife, Campstool and Mill Iron ranches who matched their toughest horses and toughest men during a respite taken when their trail herds converged on a drive to the north.

But promoters, rather than cowboys, developed the format and dramatic potential of the rodeo, sold it on its own as an exciting amalgam of the spectacle and sport, and amplified the echoes it struck from the American past. Some of these sponsors were simply patriotic citizens, who nevertheless turned shows like Cheyenne's Frontier Days and the Pendleton Roundup into annual rites as unique and reflective of the national psyche as the World Series or Fourth of July parades. But if one man deserved credit for modernizing the rodeo, it was Guy Weadick, a 101 Ranch roper-turned-entrepreneur who talked four rich Alberta cattlemen into lending him $100,000 in 1912, and used it to create the first Calgary Stampede. Weadick offered performers big money for the first time—a total of $20,000 in gold, with $1,000 guaranteed to every winner—and altered the concepts of all concerned in so doing.

Another high roller, Tex Austin, demonstrated beyond all doubt that rodeo was becoming a national

A fiber glass beast, the Golden Nugget Rider Trainer, bucks like real bull as a Texas neophyte hangs on.

rather than a Western phenomenon by drawing big crowds in Chicago (1919), Madison Square Garden (1922) and Yankee Stadium (1923). Promoters meanwhile organized themselves into a Rodeo Association of America and began naming national champions. And the cowboys themselves formed a union in 1936: the Cowboys Turtle Association ("We was slow as turtles in organizing"), which has since become the Professional Rodeo Cowboys Association.

This metamorphosis stemmed from rodeo's increasing acceptance as a big-time spectator sport—most dramatically as it punctuated its seasons with week-long exhibitions at New York's Madison Square Garden—and so coincided with the emergence of a reckless, outrageously handsome young bronc buster named Casey Tibbs, who lent the sport a kind of glamor it had never before achieved.

Tibbs, in his day, was the D'Artagnan, the Rhett Butler, the Bonnie Prince Charlie of the rodeo circuit. High school girls mooned over his pictures—one of them on a cover of *Life*. He wore an aura of recklessness and indulged his hunger for sensation as tirelessly between rodeos as in the arena. He affected purple Cadillacs, drove them 95 miles an hour for endless thousands of miles a season, and edged them off the road on occasion to run over baggage—just for the hell of it—belonging to hapless hitchhikers. He put up with injury and pain—his left ankle had been broken three times by the time he was 22 and he suffered uncounted broken ribs—with the aid of whiskey. He gambled with fervor. Managing to lose $11,000 in just one week of dice and poker in Nevada, he observed afterward: "But if I died tomorrow, I've had a helluva life."

While Tibbs was making headlines and fascinating audiences with his own particular brand of shamanism, hundreds, then thousands, of college and high school students were caught up in a craze for parochial rodeo contests. This movement, which soon encompassed even grade school kids, began with student rodeo clubs and materialized in more than 50 Western colleges, providing rodeo's big time with a kind of self-energizing farm system. The college cowboys, forming their own Intercollegiate Rodeo Association, aped the professionals from the start: all contestants paid entrance fees, competed for cash, submitted to blackballing for failing to make a ride, and drove day and night during the weekends to escape this dreaded eventuality.

Many of today's college cowboys and, in fact, many professionals as well, have been performers since they were eight or ten—the National Little Britches Rodeo Association having been organized in 1961, and having attracted embryo cowboys and cowgirls by the increasing thousands in the West and Middle West ever since. A Little Britches rodeo is a complex phenomenon: there are junior and senior divisions for both boys and girls, and from five to six separate events for each of these categories. Contestants of both sexes array themselves in astonishing varieties of big hats, bright skirts, chaps, boots and spurs, do their best to beg, borrow or steal cans of fiery Skoal or Copenhagen snuff, which they tuck inside their lower lips, swagger about, sizing each other up, and doing their best to hide the fear and excitement which are part and parcel of rodeo at any level.

Competing with a rope and a prayer

This emulation of the dress, attitudes and skills of the Old West becomes something very like obsession with these amateur cowhands by the time they reach high school. They stand raptly at attention as an announcer intones something called the "Rodeo Prayer" at their annual national competition—which drew 1,131 of them from 29 states and two Canadian provinces when it was held at Helena, Montana, in 1977: "Help us, Lord, to live in such a manner that when we take the last inevitable ride to the country up there where the grass grows lush green and stirrup high and the water runs cool, clear and deep, that You as our last judge will tell us that our entry fees are paid."

Today's reigning rodeo hero, Tom Ferguson, emerged from the ranks of schoolboys who competed as youngsters in the 1960s. Ferguson and his older brother, Larry (a top steer wrestler and roper in his own right), grew up at San Martin, California, after their father, Ira, trekked west from Oklahoma in the 1950s. They

were riders—and were absorbing the lore of the arena—almost as soon as they could walk. Ira Ferguson had competed in rodeos in Oklahoma and Texas in the 1940s, and went on seeking prize money on the West Coast in the 1950s. "I told them to stay out of it," he says now. "I thought it was an awfully hard way to make a dollar." But the boys roped cats, dogs, fence posts and bales of hay for all that, dreamed of more glorious feats, and talked their mother into driving them around California with a roping horse named Ragmop to enter local events.

Tom Ferguson refused to be lured away into his high school's team sports; he needed weekends for amateur rodeos (the bush leagues—and not amateur at all—of professionalism) and every afternoon for practice in his father's back lot, where he tried to catch eight calves and jump 10 or 15 steers every night. He was the amateur (or California Cowboy Association) calf-roping champion as a senior in high school and won a scholarship to the California Polytechnic Institute at San Luis Obispo. He did not go alone. The institution's animal husbandry department agreed to lend him stock pens, and he took six steers, ten calves and a roping horse when he set off to study agricultural business management, to go on with his punishing program of practice, and to pit himself against college cowboys from other Western schools. Not many, he discovered, were as well grounded as he, and he held his own with the best. Ferguson has made a great deal of money since he left college, breaking past records from his rookie year—and it is his earnings as well as his skills that make him an idol of the young.

This view of prizes as a reflection of hardihood and a reward for risk stems straight from the 19th century: the rodeo, for all its new trappings, has remained unchanged in attitude, essence and, largely, in procedure since it took shape at Pecos, Prescott and Miles City. But its time-honored format and a good deal of its individualism faces alteration by a syndicate of entrepreneurs who have borrowed concepts from more stratified professional sports like football and baseball. In 1978 they launched "major league" rodeo with six teams (of 15 men and 3 women), a player draft, a league commissioner, and the prospect of future franchises in cities from coast to coast. The first six teams were organized into an Eastern Conference (Tulsa, Kansas City and San Antonio) and a Western Conference (Denver, Los Angeles and Salt Lake City). The season, from April 15 to September 15, culminated in a World Championship in which the Denver Stars defeated the Tulsa Twisters. The new league has not been sanctioned by the Professional Rodeo Cowboys Association, but the Stars' owner, Guthrie Packard, believes most cowboys will come around. "People say the cowboy is a free-willed individual who wants no strings," he observes. "But team members have a rule book, dress code and curfew, and we've never had a curfew or dress-code violation."

Tom Ferguson, at least, would be surprised if the new order made much change in the cowboy himself. "We've still got to compete with broncs, bulls and steers," he says, "and *they* won't know the difference."

Fighting back tears, cowboy's wife stoically awaits aid for her husband, hurt in a bull-riding event.

Contestant sags with fatigue after a tough bronc ride at 1978 National Finals Rodeo in Oklahoma City.

Tension personified, an expectant bronc rider waits for his mount to spring from gate at National Finals.

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By Madhur Jaffrey

A total theater filled with dance, music and myth

Faces of paper, putty and rice, eyes gone wild, a language of hand signs, and that's just the beginning of India's fabled Kathakali

Hours of making up and years of rigorous training lead to such scenes as this, portraying a tale

It was, as always, a special event. Donors to the Hindu temple at Thavanur, India, had collected the necessary 1,500 rupees (about $200) to have their very own Kathakali dance-drama performance. The performers, a repertory group from Cheruthuruthy—a town about 35 miles to the north—had arrived during the early hours of the evening in rattling, backfiring buses.

It was pitch dark now. All around the temple precincts only tiny, moving lights were visible. The occupants of surrounding villages and hamlets—new brides in bright nylon saris, virile youths with slick, coconut-oiled hair, toothless crones all draped in white—were on the move, walking along the edges of paddy fields, past groves of areca and coconut palms and up hills covered with jackfruit, mango and banana trees. These villagers from the South Indian coastal state of Kerala, who in earlier times might have carried flaming bundles of dried palm leaves to light their way and help them sidestep a snake or two, now walked along guided by the beams of plastic flashlights. All paths tonight led to the temple. The insistent sounds of the Kathakali drums reverberated in the hills.

"Kathakali" means "story-play," and Kerala's three-century-old art of Kathakali lies in the eloquent telling of stories from Indian epics like the Ramayana and the Mahabharata through drama, song, dance, mime and a complex language of hand gestures.

The dim and hushed "backstage" area at Thavanur consisted of a temporary structure in the temple grounds—a large room, made up of a framework of poles covered with palm matting. With every strong gust of wind the entire structure swayed and all the oil lamps flickered wildly. These oil lamps—each about 2 feet high—together with a few naked light bulbs dangling on loose wires, provided the only lighting. The Kathakali dancers (or "actors" as they sometimes prefer to be called)—all male according to established custom and all wearing white *mundus* (saronglike lower garments)—were in varying stages of readiness. This was to be a traditional, all-night performance.

from an Indian epic. At left, a *katti,* basically evil. Above, a *paccha,* noble and divine; (for close-up of what his eye looks like, see cover). Female is played by a male. Red beard, above, is a demon.

Dancers were going though a physical and psychological metamorphosis. They were transforming themselves into supernatural creatures with divine powers, capable of hurtling through skies, lifting mountains and tearing open human abdomens with bare hands. Their dark, well-chiseled features were slowly disappearing beneath phantasmagoric, mobile "masks" that were being created, right on their faces, with freshly ground paints, white putty, cord and paper.

But there's no whimsy in these creations. Each Kathakali character falls into a designated personality type, and each type has its own general makeup (above). Because of this prescribed presentation, different characters are apt to look much alike. The noble, heroic or divine character, called *paccha,* such as Rama or Krishna, has a green face with velvet black brows and red mouth. A *katti* character, evil but with a streak of nobility, has a green base with a red and white stylized moustache snarling over each cheek. The "red beard," or demonic antihero, has a black

Photographs by T. S. Satyan

The eye, an intricate and revealing organ, can be made to do the most extraordinary things in terms

and red face and knobs on the nose and forehead. Various other details, from false breasts to holy beads, designate a panorama of personalities—females, demonesses, sages (kindly or choleric), apparitions, charioteers and evil women who are "too beautiful" and therefore suspicious.

Kathakali's elaborate makeup and costuming follow a set sequence, worked out over the centuries for economy, efficiency and speed. Each dancer sits on the floor, surrounded by coconut-shell bowls, palm leaves, grinding stones and lumps, crystals and powders of various colors. Paints are first ground, mixed with coconut oil and stored in palm leaves. Wielding a palm-leaf spine as a painter would his brush, the dancer then paints great curlicues of greens, reds, blacks and yellows on his face, all the time balancing a mirror in his free hand or, if he is pressed, between his big toes.

After his face is partly painted, the dancer lies down —his head at the feet of a seated putty master. Within an hour this master, or *asan,* will completely alter the topography of the dancer's face with dexterously applied extensions of putty, or *chutti,* paper and cork. The putty master's performance is of prime importance. The *chutti*—a thick, viscous paste made out of fresh cockleshell lime and ground rice—must be applied neatly and accurately, fitting the contours of the dancer's face. Rama needs simple, overlapping extensions built around the jawline. Until about three decades ago these extensions were built up, step by step, entirely of putty. With long periods of drying in between layers, the entire process took about four hours. Today, only the base is putty. The rest of the extension is paper—but so skillfully cut, curled and attached that a new "tradition" seems to have been started.

The dancer paints his lips and, if he is a savage, or *katti* character, he adds mushroomlike knobs (made of cork or polystyrene) to his nose and forehead. If he is playing a good woman, he crushes some mica and sprinkles it over a face which has been painted with a mixture of red and yellow powders.

The last vestige of natural color on "male" or "demonic" faces is obliterated when the dancer takes two *cundapoova* seeds and inserts them inside each lower eyelid. The eyeballs are rotated fiercely until the whites turn pink (for lovers) or a deep, bloody red (for demons).

The chief article of clothing is a voluminous billowing, knee-length skirt. On top of this comes a blouse and several flowing scarves. ("Women" wear a simple, sarilike skirt and cover their heads with a scarf.) Necklaces, ear ornaments, armlets follow. False hair, three feet long and made of dyed grass fiber, is attached. The head is covered with cloth to support a towering headdress, shimmering with tinsel, glass, peacock feathers and beetle wings. Now—and only now—when all the makeup and wardrobe are complete, does the dancer slip specially fitted, long, talonlike fingernails on his left hand. He is ready.

of expressiveness and emotiveness, as it must in Kathakali, which deals mainly with the supernatural.

Eye exercise classes are part of the rigorous curriculum of the Kerala Kalamandalam school.

With his feet already assuming the wide stance he will maintain through most of the performance, the dancer struts out into the night. About 600 shadowy figures are already sitting on the freshly turned earth. The "stage," a cleared stretch of earth, has a canopy of mango leaves. A tall oil lamp burns in front. Traditionally, this would be the only lighting, but here a few floodlights have been added. The "curtain" is a multicolored, rectangular sheet, held up by two men when needed.

Two drummers, one playing the strident *chenda* and the other a mellower *maddalam*, have been busy for hours. Now two singers, holding cymbals and a gong, sing invocation verses. The curtain is held up. Two of the main characters take their places behind it. Soon an introductory dance will commence.

At the Kerala Kalamandalam, a dancing school in Cheruthuruthy, some 12-to-14-year-old boys have spent the morning learning a similar introductory dance, practicing in airy, shedlike classrooms scattered over a hill. These boys, on state government stipends of about $10 a month, are here for a six-year course. They hope one day to join the school's repertory company. In previous centuries Kathakali troupes had been maintained by rich, cultured Hindu patrons whose two desired status symbols seem to have been private temples and private dance troupes. With the spread of British supremacy, patronage declined. By the beginning of this century it was feared that Kathakali might die out altogether. But with the efforts of people like the poet Vallathol and his friend Mukunda Raja, a state school was set up about half a century ago where not only Kathakali was taught, but also the literature and religion from which it sprang.

The training here is extraordinarily exacting and carried on in a Spartan atmosphere. In one classroom, bare-chested students with sandalwood paste smeared on their foreheads are aligned in the basic Kathakali

A New Yorker born in India, Madhur Jaffrey is a free-lance writer and actress who wrote about the cave paintings of Ajanta, SMITHSONIAN, *August 1976.*

Training, as well as performance, is meticulously disciplined and is carried out in Spartan

position—feet wide apart, toes facing front, the entire weight of the body on the curved outer soles, knees bent—almost at a "sitting" angle with the thighs turned out. The back is straight. The body sways occasionally like an elephant's trunk. There are powerful, virile leaps. But the severe, basic stance of the legs is returned to again and again.

In another classroom, students are seated on floormats. They are doing eye-exercises (pp. 70-71 and above). With the aid of the thumbs and forefingers, they hold their eyes wide open. The pupils of the eyes are made to move in circles, semicircles, diagonally, up and down and in figure eights. Tears stream down the young earnest faces and down over bare, brown chests.

A third class concentrates on facial expressions and hand gestures. Eyebrows are raised, lowered—up, down, up, down—and worked up to a frenzy of motion. Eyes are squinted so they become fine slits and widened to become round balls. The twitching of cheek muscles, frowns and quivering of chins follows. The neck is moved from side to side, shoulders shudder.

Kathakali has a poetic and precise language of hand gestures, called *mudras*, which can express words like "day," "go," "tongue," "mirror," "truth," "creation," "he," "who," "is," "doubtful," "forgetting," "breeze," "nearby" and "wife." It can indicate tense, add suffixes and prefixes and allow for similes with phrases like "same as." There are *mudras* for proper nouns, a gesture for "hairline on the abdomen" and yet another for "end of sentence." Not only that. In a sentence such as "I know your mastery of archery very well," a different "I" would be used, depending on whether the person being addressed was a woman, a great man, an equal—or a fool. This language, in which one or both hands weave graceful patterns in the air, is combined, nearly always, with movements of facial muscles, torso and legs. It accompanies and mimes the singer's words, conveying—rhythmically and with a fluid and sometimes tempestuous beauty—a complex series of emotions and ideas.

Young Kathakali students awaken even before the cock crows and prepare for a rigorous massage with sesame oil (opposite). They lie, face down, on a mat. Their legs are spread out so each thigh is at right-angles to the torso and the lower legs are at right angles to the thighs (knees rest on cushions of plantain fiber). The feet are braced against a wall. A standing *asan* massages the student with his feet—mainly his big toes —applying the full weight of his body as he does so. Then the student is turned over in the same basic position and, with the youngster grimacing, the relentless massage is continued.

Kathakali is a product of several traditions and influences. The hand gestures used in classical Indian dance can be traced to Vedic times of the ancient Aryans, when hand symbols were used in sacrificial rituals. These symbols were eventually codified and were included in the popular art of dramaturgy—an art in which dance and drama were, quite deliberately, conceived of as being one. The ancient manual on dramaturgy, the Natya Shastra to which nearly all Indian dance, drama and even film owe a strong debt, was a compilation of theories and practices prevailing around the beginning of the Christian era. According to this manual, drama was to be a mimicry of the exploits of gods, kings and householders. The subject matter was to be a popular, ethical story; its hero, a celebrated person of exalted nature. The mimicry was to employ stylized body movements, a language of

atmosphere at school which is located in town of Cheruthuruthy in South Indian state of Kerala.

hand gestures, units of pure dance, songs, music, elaborate costumes, facial paints and masks. Each rhythmic movement of the muscles and limbs was catalogued as were its effects upon the audience. In the centuries that followed, the Natya Shastra's influence rippled beyond North India to the South, to Sri Lanka, Burma, Indonesia, Thailand and Cambodia.

The state now called Kerala on the southwestern coast of India had a population chiefly of Dravidian Tamils. As Brahmans came in, they brought with them the Vedas, the Ramayana, the Mahabharata, the Puranas, as well as the theories of the Natya Shastra. A form of temple drama called Kuttiyattam developed, which followed the manual closely and in which Sanskrit plays were acted out in Sanskrit. (Kuttiyattam is still performed—one of the oldest theater forms in existence.)

In the 16th and 17th centuries, a new form began to evolve under the patronage of local nobility. The dancers—all male here—no longer recited the newer Malayalam (the local language) texts. These were sung instead, by two standing musicians, with the dancer miming the words and action of the play. There was much more dance—of an energetic, vigorous sort—which required the kind of massaging, training and discipline that was already known in the state's military gymnasiums. Kuttiyattam's makeup and costumes were elaborated upon. The new dance-drama could be performed in palaces or on village greens—wherever a patron desired. Its most popular auditorium, though, was the temple grounds. At such performances the front doors of the temple were left open so the resident deity could also attend.

Attaining suppleness is no easy matter and this is how it's done, time and time again, for years.

A pupil imitates teacher with *mudras* which express concepts, indicate tense, add prefixes and suffixes.

Today, there are several schools of Kathakali, with the Kalamandalam being, perhaps, the best known of them all. Women, generally, are still barred from local stages in traditional performances. Curiously enough, one of the first women to break into this male bastion was an American—Esther Sherman. She attended the newly formed Kalamandalam in the 1930s and, under the name of Ragini Devi, was later instrumental in popularizing this obscure southern dance. Other women have followed in her footsteps. But while they perform on stages around the world in encapsulated performances, they are rarely seen in Kerala's villages.

In a place like Thavanur, the audience is invariably knowledgeable. Its members have been brought up with Kathakali. The stories they know from books and the characters are familiar faces sculptured on their temples and shrines. When Hanuman, the monkey god, first appears behind the "curtain" and places his fierce head and taloned hand over it, shaking in growling fury, the little children, titillated beyond endurance, might shriek and giggle. But the connoisseurs wait to see if the proper passion accompanies the gestures of fury, if the dancer has flair, poise and technique, and if his dance is maintained with command and grace. These connoisseurs will listen, equally critically, to the singer, deciding if his performance meets the emotional demands of the poetic text as he tells of the injustices done to the five Pandava brothers or to their common wife Draupadi, who, dragged by the hair and insulted by the wicked King Dushasana, vows that she will not bind her hair any more until she can wash it in the offending king's blood.

And so the evening goes into the morning. As the dawn begins to break, the performance might end with Bhima, one of the Pandava brothers, tearing open Dushasana's abdomen with his bare hands and bathing Draupadi's hair with the enemy's blood. (Red paint is used for blood and the intestines are yards and yards of rope.) Or it might end with the dramatic story of Poothana, the demoness who, disguised as a pretty maiden, is sent to kill the infant Krishna with her poisoned teats. She first enters with a mincing gait and a beguiling smile. She picks up the infant and offers her large breasts (blackened coconuts). Krishna begins to suck. Some pain registers on her face. She tries to pull the infant away but finds she cannot. Dancing in increasing anguish, she is transformed into the demoness she really is. Hidden fangs pop out—her mouth contorts. She lets go the infant but he hangs on to her breasts. She beats his head and twists in pain. Finally, as the sky begins to turn red in the East, he sucks her life away.

The dancers return to the dressing area. Headdresses, jewelry and clothing are dropped neatly onto squares of cloth and wrapped up. Putty is pulled off with the help of an imbedded thread. Paint is scooped off with looped palm leaves. The weary dancer, his own lithe self now, puts on his *mundu,* lights a cigarette and hops onto the rattling bus that will take him back to Cheruthuruthy.

In the Mahabharata, Draupadi is mistreated by evil King Dushasana. She vows not to bind hair until she can wash it in his blood, which eventually she does.

Ravana, the demon king, is shown with consort. His makeup, including putty and paper extensions, indicates *katti* character—evil but not all bad.

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By Janet L. Hopson

We may follow our noses more often than is now realized

Many creatures use a chemical semaphore to communicate via the sense of smell; now it appears that humans may do so, too

Drawings by Jim Spanfeller

The French novelist Emile Zola once wrote, "It is certain that the olfactory sense is one of the snares in which nature captures man in order to guarantee the reproduction of the species."

Zola's words reflected not only his own personal fascination with scent and his compatriots' passion for fragrances, but an accepted observation of the science of his day as well.

Nearly a century later, the notion of scent in human attraction endures with the persistence of Zola's prose and French perfumery. Modern literary references abound. Commercial fragrances that claim a "secret chemical appeal" are a staple on department-store shelves. And a renaissance of scientific interest now brings sophisticated tools to appraise Zola's belief.

In an article on insect "pheromones" (chemical odor signals) in 1963, Harvard entomologist—and sociobiologist—Edward O. Wilson noted that "striking sexual differences have been observed in the ability of humans to smell certain substances." In 1971, zoolo-

A pheromone, left, the magic molecule that literally carries excitement, here leads a Pied Piper's parade of creatures whose lives are affected, and sometimes even determined, by their sense of smell . . .

gist and *Joy of Sex* author Alex Comfort, in an article entitled "The Likelihood of Human Pheromones," proposed a set of potential human responses to odor that ranged from infant-parent relations and the development of sexual preference, to attraction, arousal, aggression and dominance.

Nowadays the subject of scent signals is receiving considerable attention from scientists and scholars. And while many questions remain unanswered in this complex tangle of sensory cause-and-effect, others have been resolved.

Not surprisingly, most studies of human scent communication have been patterned after insect and animal experiments—because when it comes to olfactory dialogues, those creatures wrote the book. A great deal of the published literature on this subject, in fact, concerns the sexual attractants of a single life form—the female moth. These ephemeral beings must lure their mates over great distances and thus rely on pheromones (a word coined from the Greek meaning "a carrier of excitation") to initiate the attraction.

Entomologists such as Wilson have described the relatively simple structures, yet incredible power, of insect attractants. A male gypsy moth, for example, can respond to fewer than 100 molecules of the female's lure. And the minute pheromone content of her scent gland, if released all at once in silent aerial odor trails, could attract and excite a *billion* males!

The French naturalist Jean Henri Fabre once said he could not believe moths communicate over such great distances with odor alone: "One might as well expect to tint a lake with a drop of carmine." Fabre's conclusion, says Wilson, was wrong, but his analogy was exact. "To the male moth's powerful chemical receptors," Wilson writes, "the lake is indeed tinted."

(The human nose, with some five million olfactory receptor cells, is also remarkably sensitive. In a liter of air, a person can smell as little as one four-hundred-billionth of a gram of ethyl mercaptan—the essence of rotten meat. Researchers have found that a rabbit possesses 100 million of those specialized cells.)

Insects' specialized receptors detect messages other than love lures. Social insects such as ants, wasps, bees and termites rely on a number of pheromones—each different and chemically unique to its species—to pro-

Janet Hopson's book, Scent Signals: The Silent Language of Sex, *will be published this month by William Morrow. She wrote about her 95 days in a DNA lab in the June 1977* SMITHSONIAN.

duce the organization of their complicated societies.

Wilson's study of the large, yellowish weaver ants of Africa and Asia, for example, revealed that a few separate pheromones, combined with ritualized body movements, inspire and regulate about 50 activities. Among them are construction of enormous aerial nests, defense of the settlement, alarm and coordinated attack, silk weaving, care of the queen and larvae, grooming, food gathering and exchange, patrolling territory and capturing prey.

Insect pheromones, however, serve as only theoretical models for the study of scent signals in large organisms, because these simpler creatures respond to odors in a nearly automatic way. Male houseflies will attempt to copulate with knotted shoelaces that have been treated with the female fly's chemical sex lure. And worker ants will carry alive-and-struggling sisters out to the refuse heap if the latter are first daubed with odors of decomposition. Every house mouse or beagle can tell a live mate from a dead one. Thus human studies are based more directly on the scent behavior of other mammals.

The ancient Chinese were first to notice the attractive effects of the musk deer's strong scent and to employ these odorous secretions as a human aphrodisiac and medicine. The Greeks later noted the obvious odors of mares and goats in sexual season and applied this knowledge to animal husbandry. Not until the late 1950s, however, were controlled observations made of the olfactory life of laboratory animals, and thus were some of the mechanics of smell and behavior finally unraveled.

Mice and rats, favorite subjects of inquisitive biologists, display a wide range of reactions to odor. Scent signals from females' urine, for example, can stop other females' estrous cycles, establish bonds between mothers and infants and attract mates. The scent of male mouse urine, on the other hand, can speed a young female's sexual maturity, block a recent pregnancy, synchronize the estrous cycle or start a serious fight between males.

An arkful of larger mammals, from cats and rabbits to dogs, deer, pigs and monkeys, also communicate complex social information through natural odors. From a small urine spot deposited on a fencepost, a dog can tell the sex, age, social status and sexual readiness of the canine that passed by. These scent posts can act as traffic signals as well as community billboards, warning dogs about the safety of the territory. The post may read, in effect, "Green—no dominant,

. . . More than a mere signal that a moth is ready to mate, pheromones are the medium for much of the

aggressive males up ahead," or "Red—big mean one dead ahead!"

Higher primates such as the scrappy Indian rhesus monkey have been thought to lack the canine's powerful nose, but can, nonetheless, deduce social and sexual information from scents. The male's obvious olfactory interest in the female's rump at the time of ovulation led one researcher, Dr. Richard P. Michael of Emory University, to suspect that vaginal substances might be involved in her attractiveness. He later found a set of common odorous fatty acids in the secretions, and demonstrated them to be powerful stimulants of male sexual interest.

That finding was later challenged (and remains tentative), but nevertheless the same chemicals were reported to occur in peak quantities in ovulating women. This 1975 report caused no little stir in the scientific community, the press and among perfume manufacturers. But when further controlled tests failed to show that these particular substances excite adult men, interest waned and the search for human scent signals returned to a more promising approach launched four years earlier.

The first provocative bit of evidence had turned up in a women's college dormitory in 1971. Harvard psychologist Martha McClintock tested an effect called "menstrual synchrony" which had been, theretofore, a common anecdotal report among women who live and work together. McClintock found that roommates and best friends indeed had more closely timed menstrual cycles than randomly matched pairs of women—an effect not influenced by similar diets, daily routines or other environmental factors. The study also revealed another provocative fact: college women who date men often have shorter, more regular cycles than those who do not.

The parallels between these observations and the previous discoveries regarding laboratory mice were striking, and hinted strongly that humans might have an elaborate system for communicating via airborne chemicals. It appeared that proximity to other men and women affected the menstrual effects. But were natural odors the agents of communication?

As so often happens in science, one researcher's question is another's object of interest. And in this case, a young California researcher named Michael Russell sought the answer.

He designed a study during which 16 women reported to his lab at San Francisco State University three times per week for four months. Half of them

communication among social insects, and can signal mice to make war just as easily as to make love . . .

were daubed on the upper lip (directly beneath the nose) with plain alcohol. The other half were daubed with a mixture of alcohol and a few drops of underarm perspiration collected earlier from a single female donor. By the end of the study, he reported to a meeting of the American Association for the Advancement of Science that the women in the first group remained unaffected. All but one woman in the second group, however, experienced a dramatic shift in menstrual timing, to conform closely with the donor's monthly cycle—even though they had never met her!

Her perspiration apparently carried the chemical cue. What that cue is, and why it alters the normal cycle, remains a mystery. But the research bolstered one increasingly popular theory: humans are vertical beings with relatively insensitive noses. The source of chemical signals for social communication would logically be high on the torso—to wit, the armpit—rather than lower, as is the case with the majority of horizontal creatures.

There are reasons to suppose that axillary odors played a more important part in the sexual and social lives of early humans. Skulls of fossil hominids show that the capacities of the nasal cavities and the olfactory centers of the brain have decreased since their time. Besides, the underarm odors of our early ancestors were probably much more noticeable if we can assume they were less concerned with personal cleanliness and managed to live without tobacco.

British anthropologist John Baker, in his book *Race,* points out that the human underarm is physically warm, well-endowed with scent producing glands active only after puberty, and is protected by the arm itself. It has thousands of odor-broadcasting antennae —the axillary hairs—and it is close to other people's receiving equipment (noses). Women, states Alex Comfort, produce a "characteristic, powerful and pleasant" scent and men a musky one.

The search for a human attractant with functions analogous to those in other mammals might well begin with this underarm "scent organ," and indeed, several such studies are now in the planning stages. But does one look for attraction *by women* or *by men*? Historic cultural patterns in Western society have dictated that, for the most part, it is the role of women to attract and of men to pursue.

Where olfaction is concerned, however, two factors must be considered: men, even those physically small in stature, have larger axillary scent glands than women. And several researchers contend that women

. . . An understanding of chemical communication in the animal world can be turned to Man's advantage,

have a peak in olfactory acuity at mid cycle—the time of maximum fertility. Could it be that women are the more active receivers of human scent signals?

Speculating on the genetic bases for human behavior has always been a risky business—as in the current controversy surrounding sociobiology. But keeping in mind the tentative nature of such a conjecture, it may well turn out that women's noses contribute more toward their receptivity than ever imagined.

No one could reasonably claim, of course, that humans of either sex react with stereotyped courting behavior to a potential partner's musky chemical call. Such a claim would be met with amusement if not disdain, because humans are uniquely cognitive creatures whose actions—and even basic biological urges—are modified by thoughts and feelings. But what if a chemical scent signal affected a person's *attitude* toward a suitor—or for that matter, a friend, coworker or stranger? That mysterious affinity or repulsion itself could be a basis for future behavior.

Perhaps the most intriguing study yet conducted in the field of human olfactory communication was directed at just such a possibility. A team of scientists headed by J. J. Cowley of Hatfield Polytechnic in Hertfordshire, England, devised an exceptionally clever system for testing attitudinal responses to subtle odor stimulation.

They presented a large class of psychology students with printed personal background information on three men and three women running for a student government office. They asked the students to assess the candidate's personality traits and rate their potential effectiveness for the position. At the same time, the psychologists distributed paper surgical masks to all the students, ostensibly to hide their facial expressions while completing the questionnaire. Actually, these masks were sly vehicles for delivering imperceptibly low levels of two chemical scent signals to the unsuspecting participants.

One of the compounds was a musky-smelling natural steroid called "androstenol," which occurs in men's urine and perspiration at levels twice that in women's, and that is also responsible for the strong mating reflex of barnyard pigs. The other scent signal was the mixture of simple acids found in the vaginal secretions of female primates (and women) that apparently captures the attention of male monkeys.

The face masks were distributed so that one-third of the students wore blanks, one-third wore androstenol and the others wore vaginal acids.

as in using pheromones to control insect populations or regulate the reproduction of domestic animals . . .

The results of the experiment: The men's reactions to the six candidates were seemingly unchanged by the subtle odors. But the *women's* feelings were decidedly amplified when assessing the male candidates' qualities. When exposed to the male scent signal, they favored the more assertive candidates. When wearing the female scent signal, they invariably favored the shy, more retiring types.

For the first time, scientists had shown that women's attitudes, more than men's, could be influenced by the odor of scent signals known to be active in the attraction of other mammals. This experiment did not positively identify those two types of compounds as *human* scent signals; ours may be merely similar in structure to the androstenol and vaginal acids. But knowledge of that similarity may lead the way to other compounds. And the idea of searching for odor attraction at the level of attitude (rather than overt action) is certainly an excellent start.

In the meantime, other fundamental scent phenomena unrelated to attraction have been revealed:

- When put to the task, infants can distinguish the scent of their mother's breast from that of a strange mother's—by the age of six weeks.
- Adults, in two separate studies, have been able to choose their own and their spouses' undershirts from others' by smell.
- Additional studies have revealed some evidence that adults are able to distinguish the sexes by the odor of their urine.
- Men's urine, when rubbed on male laboratory mice, will elicit aggressive attacks from other male mice.
- And actual human urine-marking rituals have been described. Anthropologist Irenäus Eibl-Eibesfeldt reports a Hottentot tribal ceremony during which a respected village elder urinates upon a successful hunter from head to toe, or so anoints the bride, bridegroom and spectators at a wedding.

These instances of recognition and scent marking could seem utterly disconnected if it weren't for the strikingly similar phenomena seen in a wide variety of mammals, and known in those species to be examples of odor communication.

Many Americans go through a morning ritual that would make such communication improbable, even if it did exist. Despite the absence of visible dirt on their bodies, they shower vigorously, expunging the mild natural scent that has accrued since the last deluge. Following this, they apply one or more chemical deodorants. Then they add strong-smelling after-shave

lotion or perfume, containing spices, herbs, flower oils and the natural scents from the bodies of animals (musk, civet, castoreum or ambergris). The whole process may even be repeated that same night before a social engagement.

Our cultural reluctance to consider that natural scents play a role in human behavior may itself be indirect evidence of their activity. Alex Comfort argues that our armpits, with hairs that trap and hold scent, are "a conspicuous and apparently unused antenna array" that presupposes "an unsuspected communications system."

Even the confirmation of specific human scent signals will not change the fact that odor exchange is not a dominant or major mode of communication in humans. It is likely to remain a largely subliminal effect, subject to learning and controlled by emotional override. But the search, nevertheless, promises more than the vindication of 19th-century writers like Zola and the satiation of scientific curiosity.

Fragrance manufacturers are watching human scent research carefully. Sexual researchers William Masters and Virginia Johnson have studied vaginal acids and other specific natural compounds, and have stated that olfaction provides "tremendous underdeveloped potential for treating sexual dysfunction." And medical researchers are working on a wide variety of applications. One nasal spray already prevents ovulation in rhesus monkeys. It might produce the same effect in women with fewer risks and side effects than the Pill. Another nasal spray may work "the morning after" by disrupting implantation of the human egg. In still another approach, researchers are trying to perfect simple ways to detect—sniff out, if you will—molecules whose presence signals ovulation. Knowing this could help avoid—or achieve—pregnancy.

Still another medical use is in diagnosis. Researchers are now trying to analyze the secretions of people known to have certain diseases—to extend, in a way, the physician's sense of smell. The discovery of unusual substances theoretically could lead to a "breathalyzer test" for oral infections, gum diseases or cancers, and to similar chemical analyses for infections and cancers of the reproductive tract.

Perhaps the most significant early outcome of scent research, however, will be a greater understanding of how people send and receive information. And in a world of verbal overload and visual assault, the confirmation of our silent language of scent might, indeed, so to speak, be a breath of fresh air.

. . . But eventually the scent trail leads back to Man himself. Evidence is accumulating that, beneath the aura of deodorants and perfumes, humans too may follow the powerful lure of nature's chemical signals.

By Peter Neill

Challenge to BBC in Hester's trials of our Puritan era

American public TV dramatizes 'hell-fired' Hawthorne Scarlet Letter *in a major bid for popularity with a sophisticated audience*

In classrooms around the country, frequent reference is made to a work no student has ever read, an ideal called the Great American Novel. Contenders nevertheless abound, and on every list of masterpieces one title consistently appears, a novel almost every student has read, willingly or not: Nathaniel Hawthorne's *The Scarlet Letter.*

Next month public television airs a four-part adaptation of this great American novel, produced by Boston's WGBH. The talent has been carefully assembled; the budget—in excess of $2.5 million—seems generous; the videotape looks beautiful.

Will *The Scarlet Letter* capture the American public imagination the way that British Broadcasting Corporation versions of Trollope, Galsworthy, Hardy and Robert Graves have done? Will American television prove that it, too, can efficiently produce "quality" dramatic entertainment for a large audience? Will *The Scarlet Letter* demonstrate the highest potential of the medium on a scale at least comparable to the BBC and thus be recognized as the realization of the public-television mandate to offer American audiences "a different view"?

Perhaps such questions are overly dramatic and ask too much of any single production—in a way, a test-tube baby. Still, it is true that since its inception American public television has never really matched its rhetoric with its programming. The first ten years have been characterized more by struggles for financial support from Congress and local communities, by interagency battles for jurisdiction and authority, and by preoccupation with the technical aspects of building an "alternative network." Perhaps *The Scarlet Letter* is better described as symptomatic of that network's maturity, the result of greater financial stability, sophisticated technology in place, and a clearer understanding of purpose. Perhaps *The Scarlet Letter* is indicative of better things for the public eye.

Hawthorne called his novel a "hell-fired story." Indeed, Hester Prynne and the Reverend Arthur Dimmesdale, her adulterous lover and undisclosed father

Woodcut illustration of Hester was made for a 1900 golden-anniversary edition, published by Dodd-Mead.

Meg Foster portrays Hester Prynne in TV production; Hawthorne described letter as gold thread on scarlet.

Color photographs by Richard Howard

of her child, suffer extraordinary emotional torment. Hester wears embroidered on her bosom the symbol of society's severe judgment against her, while Dimmesdale carries within his heart the even greater burden of hypocrisy, guilt and remorse. "It was this pervasive sense of suffering that drew me to this book before so many others," says producer-director Rick Hauser. "*The Scarlet Letter* is not a love story, but rather a story of a love that might have been—or should never have been at all. It is the story of private, individual, independent passions."

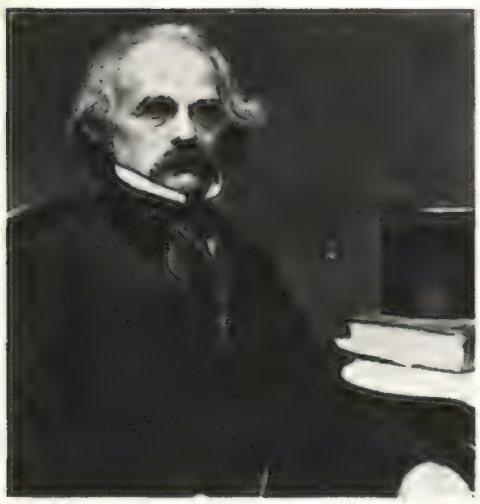
Some would argue that it is not the kind of story that will enrapture Americans more accustomed to big-screen simplistic sagas (as in, for example, Meredith Willson's quintessentially American *The Music Man* in which Professor Harold Hill, in a spirited apology for his own dalliances, manages somehow to plump for "one more A" for Hester Prynne). "So much of the story is psychologically complex," counters Hauser. "The challenge is to see the elements of self-righteousness in Hester's sainthood, of strength in Dimmesdale's weakness, and of love in the evil and single-minded revenge that Chillingworth, Hester's husband, brings to bear upon them both."

To his credit, Hauser has faced this ambiguity directly. The adaptation from novel to screenplay is faithful, although Hauser has attempted to correct dramatic lapses in the narrative and to provide new dialogue and plot essential to the continuity of the visual presentation. One example is the Election Day sermon (p. 90) that Dimmesdale delivers just prior to his public confession and death. The speech itself does not exist in the novel. In the adaptation, however, the sermon—assembled from similar 17th-century orations—provides a dramatic climax that not only amplifies our awareness of Dimmesdale's agitation, physical decline and impending redemption, but also eloquently invokes the "new world" to which the Puritans had come, that American Zion in which the commands of order—tradition, law, religion—are opposed by disorder—love, passion and the anarchy of nature.

The novel, of course, relies heavily on symbolism. Beside the prison door stands a rosebush which serves "to symbolize some sweet moral blossom that may . . . relieve the darkening close of a tale of human frailty and sorrow." Mr. Dimmesdale sees the letter "A" emblazoned across the night sky in a dull red light "burning duskily through a veil of cloud; but . . . with so little definiteness, that another's guilt might have seen another symbol in it." To attempt to equate such formal literary devices with visual images is a risky undertaking, and yet none of the three previous film adaptations of *The Scarlet Letter* avoided the temptation. Nor can Hauser, who uses long dissolves and superimpositions to abstract these images and to reduce them from equations to suggestions.

Whatever the success of adaptation or direction, this story must finally rely upon the talents of the actors.

William Baker



Robert Philippe

From left are Mathew Brady's portrait of Hawthorne, complete with upturned "stovepipe," producer-director Hauser coaching Meg Foster, and Hawthorne as narrator, portrayed by the actor Josef Sommer.

Elaborate set of 25 carefully researched structures, re-creating the Boston of 1642, was erected at Fort Adams, Newport, Rhode Island. It was built against 19th-century walls, visible at left.

These roles demand interpretation, depth and credibility, or otherwise they surely flatten into stereotypes characteristic of afternoon soap opera. From what I have seen, Hauser has produced the required performances from John Heard as Dimmesdale and Kevin Conway as Chillingworth, both trained as stage actors. I am less certain about Meg Foster's portrayal of Hester. She certainly looks the part. Her eyes have enigma in their color and sadness in their shape. Her hair, confined tightly in a cap, falls loose as she meets Dimmesdale in the forest and elicits an appreciative gasp at its beauty. But Meg Foster's experience is as a television actress and she had difficulty maintaining the intensity Hauser demanded in endless repetition until he thought she'd got it right.

Hauser's training is in public television documentary; *The Scarlet Letter* is the largest, most complicated *dramatic* production WGBH has ever attempted —facts which caused additional nervousness in an already nervous business. By Hollywood standards, however, the scale of the project was small. Even so, Herbert Hirschman, a veteran feature-film producer, was asked to join Hauser and to oversee the budget and all production details, including the construction of an elaborate set at Fort Adams in Newport, Rhode Island (above).

In the past, authenticity has been a preoccupation of similar public television projects—most notably *The Adams Chronicles.* To be responsible was to be authentic. In the name of historical accuracy, more attention was paid to costume than to character, and low ratings and high deficits were the inevitable result. *The Scarlet Letter* set is a complicated re-creation of Boston in 1642, 25 buildings, accurate from thatched roofs to garish bits of colored glass imbedded in the stucco of the governor's mansion. Authentic—down to the mudholes and pigs inhabiting them. Similar care is taken with the costumes. I have always thought of Puritan dress as somber black and gray; a misconception, it appears. The crowd scenes in *The Scarlet Letter* reveal a rich variety of colors and textures, sartorial signals of achievement and class. Plumes and ruffs are seen, and both male and female dress is resplendent with embroidery, much of it done in the story by the skillful fingers of Hester Prynne. Costumes and set consume a significant part of the budget, but "style" does not subvert this production. Authenticity is not an obsession with *The Scarlet Letter,* but it is there.

Perhaps the toughest decision for Hauser and Hirschman was to make the production on videotape

Peter Neill, who is a novelist and photographer, has been a lecturer in English at Yale University and visiting lecturer in English at Tsuda College, Tokyo.

John Heard as sinning Dimmesdale, who was thought to be a model of moral behavior by his congregation.

instead of film. "Couldn't afford it," says Hirschman, laconically. "But we proceeded as if it were film," Hauser hastens to add. "We lit the actors and set, composed each scene and sequence, *as if* we were using film." The result is effective and looks like no videotape I have seen before. Interiors, night sequences, scenes in the sun-filled wilderness forest—all have a dramatic presence that suggests that the potential of videotape has only begun to be explored.

"We just could not have done it without Herb Hirschman and the Hollywood people," says Hauser. "They have great skills." Curiously, such collaboration is also innovative. The separation between East and West Coast, noncommercial and commercial television, is as wide and schismatic as those principled disagreements that sometimes cause academics not to speak to one another in the halls. For actors and technicians of both schools to have worked together on *The Scarlet Letter,* successfully if at all, is a rarity and an exception that ought to break a stupid rule.

The source of this divisiveness is found in a major American confusion over the definitions of entertainment and culture. Somehow these two have come to be seen as mutually exclusive. But the antagonism is better explained as resistance to lack of choice. "Americans don't get what they want from commercial television," argues the *New York Times* critic John J. O'Connor. "They get what they get."

Some 47 million American families now watch public television on a regular basis. The national audience for opera, drama and documentary—programs that network advertisers are generally unwilling to finance—has been demonstrated by the success of *Great Performances, Masterpiece Theatre* and *NOVA. Civilisation* and *The Ascent of Man* have found viewers in large numbers willing to accept from television the serious consideration of ideas, but presented with authority and elegance by Kenneth Clark and Jacob Bronowski. The public system has greatly broadened the spectrum of choice, and yet it, too, is now accused of creeping "networkism" and lack of daring. Success is seen as homogeneity and betrayal.

Such critics argue that reliance on government and corporate underwriting precludes independence and mediates controversy. "We don't schedule controversy for its own sake," says Chloe Aaron, who directs programming for the Public Broadcasting Service, "but we're not afraid of good, hard-hitting documentary." In recent months, PBS stations have shown films on contemporary Nazis, homosexuality and the illegal transfer of embargoed arms from an American manufacturer to South Africa. "We see a lot of footage," continues Mrs. Aaron. "You'd be surprised how little controversy there is around."

Typically, such films are made by independent producers. Already limited by the disinterest of the commercial stations, these producers have had difficulty finding compensating support from the public apparatus. Michael Ambrosino, the respected creator and executive producer of *NOVA,* recently sought funding as an independent for a new series of anthropology and archaeology programs. His request for funds to match preliminary grants from the Corporation for Public Broadcasting (CPB) and the National Endowment for the Humanities (NEH) was rejected by some 50 foun-

Kevin Conway is the brutish Roger Chillingworth, Hester's husband, obsessed with thoughts of revenge.

dations and corporations. He finally persuaded CPB and NEH to give him funding for a year's trial run.

The Corporation for Public Broadcasting is a private organization, created to stand between the government and the public as the apolitical distributor of federal money. It and NEH and the National Endowment for the Arts have become the source to which every producer in the land must go to sell a good idea. "That we are among the largest funders of new programming is incredible and not the way it was envisioned to be," says Stephen Rabin, who directs the media program for NEH. "We were meant to stimulate, to encourage collaborations, and now we support more independent producers than the public stations combined. Who's going to sustain what we've begun?"

The CPB budget for fiscal 1978 exceeded $107 million. "But the growth of public television has been such that even this doesn't seem enough," explains David Stewart, director of special projects at CPB. "The choices are better, more numerous and complex. What should we support? Documentary? Experiment? Showcase productions like *The Scarlet Letter?* And how should we support them? Development funds? Matching grants? Complete underwriting? There are too many good ideas and too little money."

The fact is, nonetheless, that a very small percentage of CPB's appropriation actually reaches producers. For the 15 months preceding September 30, 1977, CPB awarded $113 million in grants, out of which only $14 million—12 percent—was assigned directly to producers for creation of new TV programs, although an additional $50 million went to the stations for program production and the acquisition of already available programs. All the rest went to public radio, planning, research, station operating costs, engineering and

Hester's daughter Pearl, now three, was so named, Hawthorne wrote, as "being of great price."

development, training and workshops, promotion and advertising. Worthy and necessary expenditures, but as Steve Rabin puts it, "If there is no programming, all the rest doesn't mean a damn. We have a lack now. Where will the stuff for the future come from—and who's going to pay for it?"

How public television is to be financed is a major consideration of current studies by Congress and the Carnegie Commission on the Future of Public Broadcasting. The following are just a few of the alternative schemes that have been proposed:

- A tax checkoff: designation on income-tax forms of a sum to be diverted to a national trust for the support of public television, similar to the checkoff now used to underwrite the national Presidential campaign.
- An excise tax: a surcharge on each television set, paid annually by the owner into a similar fund for national programming.
- An advertisers' tax: a surcharge for advertising on the commercial networks, also paid into the trust.
- A spectrum-use fee: charged to the commercial networks for the right to use the broadcast spectrum.

"But even if we have additional dollars," continues David Stewart, "the question remains: whom should we support? Independent producers? Production companies? The local stations?" David Ives, president of WGBH, puts it differently. "We are going to have to decide whether we want a central authority and a national program or an interconnection of autonomous stations and a plebiscite among them over every good idea."

Both alternatives seem possible. Increased funding from whatever sources could provide greater discretionary money to the stations, allowing them through their advisory boards and constituents to schedule whatever kind of programming they desire. They could support local film makers and their own productions, or they could purchase programs made elsewhere in the system; they could opt for propaganda or controversy, entertainment or culture.

At the same time, increased funds could be provided to a central authority responsible for programs of nationwide interest or beyond the budgets of the stations. This organization could provide a national program schedule—perhaps two or three hours daily—to the entire system. "Could we not have, then, an 'American Masterpiece Theatre,' " asks Ives, "a series of dramatic narratives from our literature and history, produced by various stations or independents under the sponsorship of a central funder?" Says Chloe Aaron, "We should have 52 weeks a year of drama like *The Scarlet Letter,* Sunday nights, nine o'clock, and I don't care where it comes from."

Until now, much of it has come from England: *Upstairs, Downstairs; I, Claudius; The Forsyte Saga; Anna Karenina; The Pallisers; War and Peace* and *Elizabeth R,* to name some of the more outstanding series. American productions such as *The Adams Chronicles* and *The Best of Families* have only briefly interrupted this stream of imports from the BBC. "What has made the BBC successful," says Michael Ambrosino, "is that they understand that money generates product by generating people." And then, there are the rich resources of traditional British theater and training: the Royal Academy of Dramatic Arts, the Royal Shakespeare Theatre and the outstanding, technically impeccable provincial repertory companies. "When someone becomes obsessed with an idea," affirms David Ives, "the BBC gives him the freedom to go off and do it, without all the bureaucratic delay and searching for money our system requires." Only the experimental series *Visions* has provided similar opportunity to American writers, actors and film makers—and this year, after three seasons of uneven but always interesting production, *Visions* is likely to leave the air.

The Scarlet Letter, then, is a cultural test: of its actors and director and crew, of our response to the virtues of good storytelling, and of the public broadcasting system as a whole. Success should fuel the appetite for more programs of similar quality and the system will adapt, no doubt.

In *The Scarlet Letter,* Hawthorne offers a moral admonition which has application here: "Be true! Be true! Be true! Show freely to the world, if not your worst, yet some trait whereby the worst may be inferred!" So, if you watch *The Scarlet Letter,* look for the worst, hope for the best.

Townsfolk react stonily to seeing Hester, wearing her letter for the first time, on way to public obloquy.

By J. K. Obatala

The unlikely story of blacks who were loyal to Dixie

Even slaves, especially the house servants, sometimes played a part in The Cause, serving bravely under the Stars and Bars

Despite reams of writings on the "New South," few artists, intellectuals or scholars have come to grips with Southern history. We still tend to characterize the current state of affairs in the South as a "Second Reconstruction." The truth, it seems to me, is that Southern race relations are more on the order of a New Confederacy than a Second Reconstruction. Reconstruction was characterized by the *estrangement* of black and white. The Confederate era, on the other hand, was a period which produced a considerable amount of cooperation between whites and those blacks who remained loyal to the South during the war. While it is true that the vision of the devoted slave, working loyally for his master's cause, is largely myth, there were outstanding and memorable instances of black patriotism among slaves and "free men of color." The blacks in these instances were not merely passive participants in the Southern cause; they were serving to protect their homes.

An early indication of Afro-American involvement in the Confederate cause was the enthusiasm with which many blacks endorsed secession. As the various state legislatures announced their decisions, ardent patriotism was displayed among some of the slaves. In April 1861 a group of Afro-Americans in Petersburg, Virginia, who had volunteered to work on fortifications in Norfolk, held a mass rally at the courthouse square. They were presented with a Confederate flag by the former mayor, John Dodson, who promised the volunteers "a rich reward of praise, and merit, from a thankful people."

The black spokesman, Charles Tinsley, a bricklayer, accepted the flag and responded, "We are willing to aid Virginia's cause to the utmost of our ability . . . and we promise unhesitating obedience to all orders that may be given us."

New Orleans' blacks not only staged what historian Benjamin Quarles, in *The Negro in the Civil War*, termed a "monster mass meeting," but they also organized two regiments of "Native Guards"—this to make good their expressed commitment "to take arms at a moment's notice and fight shoulder to shoulder with other citizens." The guards were eventually joined with the state militia, and paraded with white troops in November 1861. The black companies even supplied most of their own arms. (They did not, however, stay with the Confederacy.)

Incredible though it seems, many slaves made financial and material contributions to the Confederacy. In Alabama, William Yancey's slaves brought $60 worth of watermelons to Montgomery for the soldiers. A South Carolina slave was moved to contribute his life savings—$5. Some slaves turned their formidable talents for showmanship into sources of funds for the Confederacy. Even the most fervent fire-eaters in Charleston must have been somewhat subdued by the "Confederate Ethiopian Serenaders," a group of slave singers who turned over the returns from one of their concerts to help finance the production of gunboats and munitions. "It became a custom," noted E. Merton Coulter in *The Confederate States of America, 1861-1865,* "for slaves to hold balls and concerts and give the money . . . to aid soldiers' families and to other patriotic causes."

Some skepticism about ultimate loyalty

Within certain Confederate circles, however, the black patriot was seen with jaundiced and perennially suspecting eyes. Many white leaders were conscious of their would-be allies' reputation for being more or less geniuses, as Bell Irvin Wiley put it in *Southern Negroes, 1861-1865,* at "anticipating what a white person would like to hear, and saying it in a way pleasing to the whites." That concern was evident in a notation by Mary Boykin Chesnut, wife of a former U.S. Senator and military aide to Jefferson Davis, in her unusually candid *A Diary From Dixie.* "Mr. Chesnut's Negroes offered to fight for him if he would arm them," she recorded, in a March 18, 1862, entry. "He pretended to believe them."

Mr. Obatala, a free-lancer, often writes on black roles in history. He updated black studies in SMITHSONIAN, *December 1974.*

Slave groups like the "Confederate Ethiopian Serenaders" put on fund-raising concerts and turned over the proceeds to help finance Rebel war supplies and soldier benefits.

Illustrations by Arthur Shilstone

Blacks formed an abundant, well-seasoned work force, releasing "Johnnies" to fight.

Such skepticism was not altogether unfounded; thousands of blacks had already sought refuge behind the Federal front. Not long after Mrs. Chesnut's notation, a Confederate regiment of free Negroes offered their services to the Union's General Butler when he entered New Orleans. He declined that offer but later recruited freed slaves, and in September 1862 the First Regiment Louisiana Native Guards was mustered into the Union Army.

White "purists" formed still another obstacle to black involvement. Writing in Atlanta's *Southern Confederacy*, the editor said, "The idea of a lot of buck negroes and saucy house gals meeting in a public hall, and dancing, fiddling, sweating and fuming to raise funds for our sick soldiers, is supremely ridiculous."

A scene from GWTW

Yet the use of blacks in some jobs was not only widely approved but provided for by the Confederate Congress. Unsurprisingly, most of these occupations fall under the rubric of military labor. Slaves and free blacks formed an abundant, economic, efficient and well-seasoned work force. They also helped conserve white manpower. "Every 'Sambo' wielding a shovel," Wiley observed, "released a 'Johnny' for the ranks."

One well-known testament to the worth of the black military worker is his appearance in Margaret Mitchell's *Gone With the Wind*. The scene is a surprise encounter between Scarlett and Big Sam, the black foreman of Tara. Scarlett, riding in a carriage with Rhett Butler, meets Sam in a crowd of "sweating black men with picks and shovels over their shoulders, shepherded along by an officer and a squad of men wearing the insignia of the engineering corps. . . ."

"What are you boys doing so far away from Tara? You've run away, I'll be bound. . . ."

"Runned away?" answered Big Sam. "No'm, us ain' runned away. Dey done sont an' tuck us, kase us wuz de fo' bigges' an' stronges' han's at Tara." His white teeth showed proudly. "Dey specially sont fer me, kase Ah could sing so good. Yas'm, Mist' Frank Kennedy, he come by an' tuck us."

"But why, Big Sam?"

"Lawd, Miss Scarlett! Ain' you heard? Us is ter dig de ditches for de w'ite gempmums ter hide in w'en de Yankees comes."

But the black Confederate laborer did a lot more than dig ditches. He carried the wounded, tended the sick, drove the teams, moved the guns, raised redoubts, grew the crops and cooked the food—to name but a few random chores. Thus, since planters grew increasingly reluctant to release their slaves to the military, the government thought it urgent enough to pass an Impressment Act in 1863. As amended a year later, it provided for the impressment of up to 20,000 slaves.

This slave braved bursting shells to bring his master a bucket of ham and rice.

Not all workers were impressed. Many of the cooks were either body servants or free blacks and made up an important contingent in the Confederate Army. Before the government began allocating four cooks to a company, some soldiers chipped in and hired their own. Such extraordinary measures were more than justified, according to a Southern journalist who reported biscuits cooked by white Confederate soldiers, "which if hurled against the side of a house or tree, would stick there through a heavy rain storm."

Many black cooks were also adept and resourceful foragers. Among the more famous was "General Boeyguard" who earned his reputation during Lee's invasion of Pennsylvania in 1863. He would leave the march at reveille and not be seen again until evening —at which time the six officers in his mess were liberally indulged with assorted delights from the tables, orchards and barnyards of the local Pennsylvania Dutch farmers.

Cook Bill Doins acquired his nickname from his habit of referring to his cooking utensils as "my doins." A free black, he was working on a Chesapeake Bay oyster boat when Virginia seceded. On hearing the news, the entire crew quit, and Bill joined the Confederate Army. After the Battle of Antietam when Lee retired his forces across the Potomac, Doins received an order for an issue of cooked rations. There

Rebel black cooks saved soldiers from biscuits which would stick to a wall through rain.

was plenty of flour nearby, but the pots and pans were miles ahead in another wagon. Doins had the flour brought down to the river, mixed the dough in barrels, adding river water as he needed it. He ordered a picket fence cut down for firewood. As the barrels were broken, the heads were used first to cook the bread on, then for additional fuel.

Cooks were not the most renowned of black military personnel. That status belonged to the ubiquitous "body servant." He was usually a slave, charged with attending to the personal needs of his master, probably an officer. In effect, he was a true Johnny Reb. He fought, foraged, captured prisoners, was himself captured and often died. And when white Johnny marched, it was often to black Johnny's music. His loyalty was legendary.

In *The Confederates States of America, 1861-1865,* Coulter published a drawing from *Harper's Weekly* (October 1861) showing a black musician beating a bass drum in an army recruiting parade at Woodstock, Virginia. And Wiley found that Josephus Black and two other servants of General John B. Gordon provided the music to which his regiment marched. Interestingly enough, Confederate law required that black and white musicians receive equal pay.

No less interesting were certain remarkable acts of personal and political loyalty. Mary Boykin Chesnut made note of a Columbia, South Carolina, black who braved the battlefield, shells bursting all around, to bring his master a bucket of ham and rice! *The Linden Jeffersonian* on August 8, 1862, carried a report from the Richmond front, which told of a servant named Nathan who was captured by a Federal officer. "The Negro was sent to a spring to procure some water for his new master. But instead of performing that task he kept on his way to the Confederate lines where on his arrival he presented himself to [the commanding

Yankees reported Rebel guns served by blacks, with one white officer directing the fire.

general] together with two horses which he captured from the Yankees on his 'masterly retreat!' " Nathan was returned to his old master's service.

Captain George Baylor of the 12th Virginia Cavalry recalled how one of his servants "rendered himself obnoxious to the Yankees" by directing some Federal troops across the Potomac at Harper's Ferry, where a detachment of Baylor's men awaited them.

During the Battle of Brandy Station, two of Baylor's servants named Tom and Overton supplied themselves with arms left by retreating Federal troops and "joined in the company charges." They "succeeded in capturing a Yankee Negro . . . and brought him safely into camp." The servants were "highly delighted" with their trophy, Baylor said, and they held on to him for several months. They made the prisoner rub down their master's horses, fetch firewood and water, and "do other chores about the camp."

Slave recalled serving guns

Body servants, although the most likely to be in the midst of the fighting, probably were not the only ones to see combat with Rebel forces. It is difficult to separate the apocryphal anecdotes from the historical. James Munro McPherson, in *The Negro's Civil War,* published a statement (purged of its plantation dialect) by John Parker, a slave who served in the Battle of Bull Run: "I arrived at the Junction two days before the action commenced. They immediately placed me in one of the batteries. There were four colored men in our battery. I don't know how many there were in the others. We opened fire about ten o'clock . . . couldn't see the Yankees at all and only fired at random. Sometimes they were concealed in the woods and then we guessed our aim. . . . My work was to hand the balls and swab out the cannon. In this, we took turns. The officers aimed the guns; we fired grape shots. The balls from the Yankee guns felled thick all around. In one battery, a shell burst and killed twenty, the rest ran. . . ." The fact that grape was not used in field pieces during the Civil War points up the problems for the serious student of the war. It may have been a case of mislabeling, or it may have been fantasy.

A *New York Times* correspondent with Grant in 1863 wrote, "The guns of the rebel battery were manned almost wholly by Negroes, a single white man, or perhaps two, directing operations." Unfortunately, Confederate sources to reinforce this story are lacking.

By that year, the ranks of the Confederate army were dismally depleted. And slaves and free blacks formed a veritable fountain of military youth. But when the press, and later General Patrick Ronayne Cleburne, suggested arming slaves, Jefferson Davis suppressed the question. Georgia's Governor Joseph E. Brown

felt that " when we establish the fact that they are a military people we destroy our theory that they are unfit to be free. . . ."

Although Cleburne's proposal aroused consternation, his idea was later approved by Robert E. Lee and in March 1865—after much political haggling—the Confederate Congress finally passed a bill authorizing the use of slaves as troops. The act contained no anti-slavery clause, but it was generally assumed that those who served would be freed.

By the time the first black companies were raised, the fate of the Confederacy was sealed. There were fascinated onlookers when freshly outfitted black troops paraded in Richmond, but it appears to have been more of an opéra-bouffe affair than a solemn occasion. "A little more than a week later," noted historian E. Merton Coulter, "Richmond had fallen and with it the Confederacy."

But why would blacks fight in the first place? Why would they support in any shape or form a regime committed to their own subjugation? James H. Brewer, writing in *The Confederate Negro: Virginia's Craftsmen and Military Laborers,* suggests that they were "denigrated, corroded by degradation, and psychologically disabled by oppression." Indeed, it is too often forgotten that the world of the slaves was limited to the plantation; and that the plantation system simply wasn't designed to turn out Eldridge Cleavers or Andrew Youngs.

Yet thousands of ignorant and denigrated blacks went over to the Federal side, so there were other operative factors. One was money. Free blacks earned up to $30 a month in the army, plus upkeep for themselves and their families. Slaves made money trading in whiskey, food, horses and other bounty from their foraging missions. Nathan, the servant who escaped from the Yankees with two horses, made a net profit of $50 on one and kept the other for his personal use. Slaves even lent money to white soldiers and charged them interest.

The quest for freedom also played a key role in black Confederate thoughts. Army life offered slaves an opportunity to escape plantation routine and to travel. There was also the likelihood of being manumitted on good service. Then, too, it was widely believed among blacks that freedom was inevitable no matter who won the war. In this opinion they were supported by many insightful whites, including Jefferson Davis, Robert E. Lee, Patrick Cleburne and, of course, the infinitely perceptive Mary Boykin Chestnut of Charleston.

Local attachment also prompted many blacks to come to the aid of the Confederacy. Many house servants felt secure in their environment and preferred not to change. Wise slave owners strove to inculcate that attitude in all their bondsmen. Jefferson Davis even established a system of self-government on his plantation. Slaves had their own court before which offenders appeared prior to being punished. Conse-

quently, when Vicksburg fell in 1863, the Davis slaves refused to follow the Federal army. Soldiers had to physically remove some of them. And by 1865, almost all of them had drifted back.

The corollary, of course, is that the Rebel black seems to have had at least a primitive, instinctive feeling that his fortunes were tied inextricably to those of the South. That he was a Southerner. In this regard, the black Confederate—far more than the Reconstruction politicians who were appendages of the Republican North—was the prototype of the modern, middle-class black of the "New South." In fact, it was a strong sense of regional pride that helped generate the Civil Rights movement of the 1950s and '60s. This is clearly evident in the imagery invoked by Dr. Martin Luther King in his famous March on Washington address, in which he envisioned the day when black and white Southerners would come together and create a new social order.

The new order is symbolized for me, to some extent, by Jimmy Carter and Andrew Young, and by the President's friendly feud with National Urban League director Vernon Jordan. But these highly publicized relationships were also foreshadowed in the Confederate era.

When Jefferson Davis was captured at Irwinsville, Georgia, after fleeing Richmond, he had with him James Jones, his coachman and valet. Jones sounded an alarm as Union troops closed in on the forest where Davis was in hiding. He threw a raincoat around the fallen president's shoulders (Union soldiers later reported that Davis had been captured in a dress). And, finally, Jones claimed that Davis gave him the Confederate Seal to hide.

The irony is arresting, for the legacy of James Jones and other Confederates has been inherited by the very groups from which a number of today's prominent national figures have come—the black middle and upper classes. Leaders like Jordan and Young, who come from educated families, with deep roots in the South, may conjure up to us the ghosts of martyred Union soldiers and runaway slaves. But in fact their historical ancestors might just have worn the butternut of the Old South rather than the blue of the Union Army.

Slaves and free blacks formed a large military resource, and here are shown moving ordnance.

By Richard L. Williams

Last of a series

How to get on top as a city: attract do-gooders who do

In the Upper Midwest and on the Pacific Coast, enlightened self-interest – plus youth and muscle – has made the difference

The cities, like all of us who live in them or as far as we can from them, never lack somebody to blame for their troubles. Six years ago it was Richard Nixon, who as President cut off many urban programs, including aid to the poor, with what was euphemistically called a moratorium. Now it is the U.S. House of Representatives. Before they went home this winter, Congressmen simply allowed to die the "antirecession fiscal assistance" program that cities all over the country had come to depend upon. This saved the taxpayers, but deprived communities of, $340 million.

"Distressed" cities, that is. Not including Minneapolis and some other, younger cities of the Plains and the West because they are, for the present, undistressed, with below-average unemployment.

Minneapolis is not blaming, or complaining. It has its problems (pollution, parking, a shrinking population) but has no need to run up distress signals. Along with its older, staider, smaller twin city of St. Paul across the Mississippi, it does have one problem that for years everybody talked about but did nothing imaginative about. Namely, the weather. This metropolitan area has the chill distinction of being the coldest in the country for its size (average winter temperature 16 degrees F).

The solution was second-floor-level, climate-controlled skyways for pedestrians. Minneapolis now has 17 of these privately financed links between buildings, and ultimately it will have 76, for people to rise above the snow and slush and splatter from traffic.

"Privately financed" is the operative term. The Twin Cities have neither turned up their noses at federal aid nor been abjectly dependent on it. St. Paul accepted its old, multiturreted Federal Courts Building as a surplus gift from the General Services Administration, but it was the local Council of Arts and Science and public, nonprofit Minnesota Landmarks that raised money to recycle the block-square monument as a cultural center. Minneapolis saw the handwriting on its own downtown walls more than 20 years ago: business was going to disperse, and in time the central business district could become a depopulated shell.

A big part of the solution, inspired by the then-new Downtown Council, was the now-famous Nicollet Mall. Eight blocks of a major avenue were transformed into a squiggly, tree-lined street for buses and pedestrians (with heated sidewalks to melt snow and ice), mostly at private expense to property owners and with the city acting as its own general contractor.

The Mall has worked, has been widely copied and now is being extended four blocks to meet the new Symphony Hall and Loring Park, an ambitious housing and hotel redevelopment neighborhood. Not as a side effect, the Mall has changed the face of the city. (It cost about $4 million, has leveraged $400 million in new building and rehabbing.) And where once the Foshay Tower was the tallest landmark on the western Plains, it has been dwarfed in height by such skyscrapers as the 57-story IDS tower, and in bulk by the dipsy-doodle catenary facades of Gunnar Birkerts' Federal Reserve Building. Much more is in the works.

Minneapolis-St. Paul is home to 37 major corporations, and home to many affluent corporate and pri-

Dayton skyway connects the Minneapolis department store and Crystal Court of IDS Center, rising at top.

Photographs by Gerald Brimacombe and Ted Streshinsky

vate foundations that like to spread their wealth around. (Last year the McKnight Foundation, started by a former head of 3-M, committed $10 million to the revitalization of St. Paul's Lowertown, a 16-block area that has been in steep decline.) A lot of the local rejuvenation can be credited as "tithing" (at 5 percent, not 10) by business. A federal law permits corporations to deduct 5 percent of their gross profits for charitable contributions. The local example of such good works was set 33 years ago by Donald and Bruce Dayton of Dayton's pioneer department store. Today, all 600 units of the expanded Dayton-Hudson chain are giving $7.5 million of 1978 profits to the communities where they do business. Thirty-four Minnesota firms have followed suit. If every corporation did so, nationwide, business would provide up to $10 billion a year for civic betterment, ten times the present amount.

Says Wayne Thompson, who works as senior vice president of the benevolently paternalistic Dayton-Hudson Corporation: "Minneapolis has the most enlightened and sophisticated business leaders in the country. Their hearts are in it and they know it's good business to ensure a good environment for firms, their employees and their customers."

Three local corporations have "adopted" declining residential neighborhoods and committed resources to reversing the decline. While not everybody in town can afford a high-rise view of the lakes, or tickets to the Tyrone Guthrie Theatre, Minneapolitans and St. Paulites in general can be thankful that much big

Nicollet Mall, with Yamasaki-designed Northwestern National Life arches rising at the far end of the serpentine, is festooned with seasonal decorations. It is closed to passenger cars, but open to buses.

Dayton brothers Donald (left) and Bruce plow part of their retail chain's profits into civic projects.

Flanked by town houses and condominiums, new Loring Greenway will meet Nicollet Mall extension.

money of the Twin Cities is available for their total environment, not hoarded by and for the precious few.

Some cities out West are fortunate in having youth and topography going for them. Whether they still can avoid the built-in obsolescence and other mistakes of older cities has not yet been determined. Frontier hamlets until the mid-19th century or later, they have not lived long enough to be ravaged by the decay of old age. Defacement for the sake of freeways and urban renewal has only scarred and not yet destroyed them.

In the cases of San Francisco and Seattle, though, it has come close. San Francisco was half paved over before it realized what was happening and put a stop to it, halting some freeways in mid-air. Most of its "built environment" goes back only to the events of 1906, and it is lucky to have people who are out to save the best that remains of what earlier people built before the earthquake and fire.

One such don't-tear-it-down developer is Ron Kaufman, an entrepreneur with a sense of history about him. Behind his headquarters rises the craggy face of Telegraph Hill and the lighthouselike cylinder of the Coit tower. Spread out before him is the waterfront, once crowded with the comings and goings of big ships.

From his eighth-floor rooftop surmounting a 1914 warehouse, Kaufman has as sweeping a view of the harbor as has anyone at the Top of the Mark, only more intimate. And he made his vantage point himself. On one office wall he keeps a big map of San Francisco. Strings lead from pushpins to before (pre- and post-earthquake) and after photographs of buildings he has rehabilitated. His specialty has been "problem" structures along the North Waterfront, targets for the wrecker's ball that have outlived the uses for which they were built. His delight, and his profit too, has come from saving the old hulks for new lives, like an 1896 brick icehouse he restored as an office complex with high ceilings and a verdant garden courtyard.

A mix of Victorian and Japanese

San Francisco has needed its Ron Kaufmans. The city gave up years ago as the West Coast shipping center, relinquishing the role to Oakland across the bay, which equipped itself with greater dispatch to handle containerized cargoes. But as the self-made financial stronghold of the Pacific seaboard—and it is still many Americans' ever-romantic, favorite city—it did not have to worry. It became an example of urban renewal at its best: without putting up a penny of cash from its own treasury, San Francisco obtained a quarter of a billion dollars in federal money, in exchange for contributions "in kind" such as streets and sewers and parks. The equivalent of one acre out of every 25 in

the city limits was earmarked for renewal by the energetic local redevelopment agency. More than a billion dollars in private money has been invested in the city's future, says Wilbur Hamilton, who runs the agency.

One bright result is the Western Addition, where 87 city blocks of slums have been cleared or rehabilitated. It encompasses 4,000 new homes, 1,000 restored ones and the handsome Japan Center, financed partly by local Japanese, partly by the Japanese government. Last year a Victorian Square was created in the Western Addition. In the dead of night when traffic was nonexistent, eleven old, gingerbready houses perched on their ground-floor storefronts like so many setting hens, were hauled in on rollers (opposite).

Wilbur Hamilton, left, directs San Francisco's Redevelopment Agency, which has led the remaking of the city. Ron Kaufman, right, is a developer who has saved old warehouses, given them new lives.

Excavators dig a pit in Yerba Buena area, at foot of skyscrapers, for a new convention center. It will

The city's redevelopers still have plenty to do. For 20 years the 87-acre Yerba Buena Center, south of Market Street, has been waiting to be reborn. Bulldozed into a flatland of parking lots ten years ago, the inner-city site has been approved by the voters as the place for an $85 million convention center. Construction has been delayed by a lawsuit. (In California, birthplace of the tax revolt, it costs only $48 to start an action likely to gum up somebody's public works.)

The Yerba Buena neighborhood has been called "the navel of San Francisco," and there is a potential jewel of great visual price in the navel. It is the abandoned Jessie Street substation of Pacific Gas & Electric, a neoclassic design by the late architect Willis Polk. No redevelopment agency is always right, and the local one was all for demolishing the building. Defenders thwarted that; they got it placed on the National Register of Historic Places and, in time, meandering *paseos* will lead visitors past the landmark.

Like Atlanta, Chicago and Los Angeles, San Francisco has its own mammoth, John Portman-designed Hyatt Regency hotel. The local megastructure is Embarcadero Center and the adjoining Golden Gateway, a city-within-a-city. In the complex, those urbanites who can afford it may live, shop, work, go to the movies and otherwise spend their lives without ever setting foot on the ground level 25 feet below them. Along with The Cannery, Ghirardelli Square

be underground, topped by 18-acre public gardens. Red-brick Jessie Street substation is at left center.

and other spectaculars, it is a sign that San Francisco still likes to do things with a big-scale flourish. The city requires developers to spend one percent of their gross construction costs to commission millions of dollars worth of works of art to grace its new architecture. It may well be the homosexual capital of the Western world—about one-fifth of the electorate has been reported to be that way, which says something about its long-range future—but San Francisco still operates with muscle as well as with style.

Seattle always stands high on "quality of life" rankings and "most livable cities" lists. It ranks low (No. 55 out of 58) on a federal listing of urban centers' disadvantages. To have a home or office with a view (salt or fresh water, woods or mountains or the whole works) always has been important there, as have "view corridors" down which every distant prospect pleases.

But the Alaskan Way viaduct along the Elliott Bay waterfront, and the noisome freeway (part of the Canada-to-Mexico Interstate 5) that slashes the city from top to bottom, are sad disfigurements on a comely face. They were built in the 1950s and 1960s (nobody would think of allowing such ugliness today) and the scar tissue is not about to fade away.

"Besides," says Richard Haag, the University of Washington landscape architect who designed Gas Works Park (SMITHSONIAN, November 1977), "if we did

A stepped shopping gallery at Embarcadero Center has tables and chairs for fast-food customers.

Victorian houses roosting on storefronts were moved into the Western Addition near new Japan Center.

tear down and break up the concrete of Alaskan Way, there'd be no place to put all the chunks of debris. All the environmentally acceptable dumps around here are too full already." Freeway Park, designed by Lawrence Halprin & Associates, has roofed over four downtown acres of depressed freeway, and the sound of recycled waterfalls drowns out the chain-saw *vroom* of traffic below; brown-baggers now can munch their lunches in relative peace (opposite, lower right). The park is pretty, but, with its supporting bridges, it cost $9.6 million and to gloss over a dozen miles of freeway through the city would cost just too many dollars.

The population of half a million that lives with, and moves on, these superhighways is unusual if not unique in make-up. A study for the city council published in 1977 showed that a third of all the households in the city were single-person households; there were children in only 27 percent of Seattle's dwelling units. School population was falling, the singles population was on the rise, and where those trends would lead can only be guessed at.

"White flight" was as alarming here as anywhere in the East. Out-migration of whites, and their plummeting birth rate, subtracted 83,000 people, 16 percent of the city total, from the population between 1960 and 1975. Meanwhile, minorities more than doubled, to 15 percent. In 1971 unemployment was a high 12 percent (down to 4.5 percent by October 1978), Boeing being very conservative about rehiring its laidoff thousands. It was in the suburbs that families had the income and the offspring, with children in three out of five homes.

Seattleites, including those who work there but live outside, are proud of several city-saving victories won in the recent past. One is the restoration and reuse of the Pioneer Square neighborhood, full of solid turn-of-the-century office structures by the architect Arthur Fisher. Once apparently doomed by a highway program, this waterfront end of the famed Yesler Way skid road was instead reclaimed and refurbished.

Another: Pike Place Market. A ramshackle warren clinging to the bluff overlooking the bay, it was for generations a many-fragranced mart where produce farmers and populace met to haggle, to sell and to buy. In 1969 a misguided improvement plan called for its demolition and replacement. By a lopsided referendum vote in 1971, citizens ashcanned that plan and created the first urban historic district anywhere to be set up by voter initiative. Now the public market, still in quaint character, is being renovated stall by stall, and a good-looking residential area is growing up around it.

Mayor Wes Uhlman left office last January with another victory chalked up, the fruits of which will be years in the ripening. That is the rezoning of the Denny Regrade wasteland, "a battle I fought for three years." A hilly district of homes and hotels—and later, whorehouses—until a local, not federal, urban renewal project sluiced its heights into the bay, it became

In middle of Seattle's Pioneer Square this cast-iron, glass-roofed pergola has been restored.

Central Waterfront Park, built on site of old piers,

a nondescript neighborhood of service stations, fast-food emporia and old apartment buildings between downtown and the market to the south, and Seattle Center and the Space Needle to the north.

But in 1975 it was rezoned to encourage residential use. In time more than 14,000 people of all ages and income levels may live there, within close walking distance of the city core. It can help solve what Uhlman called Seattle's biggest problem, "maintaining the viability of our urban neighborhoods."

New Mayor Charles Royer, a former newscaster, may (before long, he hopes) claim still another victory. Westlake Mall, in the very heart of town, will not be surmounted by a luxury hotel, as once planned, but possibly by a new "people place," the Seattle Art Museum or a public park. Walkways would connect it to the city's three main department stores, and the terminus of the Monorail—a successful holdover from the 1962 World's Fair—would be relocated close by. There is a lot of local controversy about the plan but in one daring stroke—it being unusual for an art museum or a park to become the hub of a metropolis—Seattle might save downtown retailing, and any city that does that is well on the way to saving itself.

If there is a cure for all the troubles that beset the cities—little, big; old, young; Frostbelt, Sunbelt—it will be found partly in science and government but mainly through people willing to get, and stay, involved. Monsignor Geno Baroni, an assistant secretary of HUD, is fond of saying that "neighborhoods are the building blocks of cities," and fond of preaching pluralism as an ism that America must accept and exploit. But his is not a metaphor that will work any miracles by itself. It takes people to put building blocks together, and people can as easily kick blocks apart as assemble them.

Like all optimists in his field, Monsignor Baroni has to believe that enlightened self-interest will prevail. And he may be right—that, given enough heroes, the salvation of the cities will be effected. But it will not be easy on the heroes.

Arthur Skolnik, left, while city conservator, and architect Victor Steinbrueck helped save landmarks.

has splashy fountains and a view of Elliott Bay.

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Some helping hands

There is no lack of them; at last count more than 200 federal programs alone provided financial and technical assistance for conservation and rehabilitation work. Following is a rundown of some of the main public, quasi-public and private agencies involved in helping cities to help themselves. (Most figures are estimates for fiscal 1979.)

FEDERAL DEPARTMENTS

Housing and Urban Development (HUD)

- Community Development Block Grants, to prevent new slums, help revitalize old ones, generally restore cities, mostly for the benefit of low- and moderate-income groups. Budget: $3.5 billion.
- Urban Development Action Grants, to leverage private investment in helping to revitalize the economies of "distressed" cities: $400 million.
- Section 8 housing program, to provide rent supplements to enable low- and moderate-income families to afford better housing: $1.1 billion.
- Section 312 rehabilitation loans, long-term and low-interest, to fix up housing in older neighborhoods: $240 million.
- Federal Housing Administration insures mortgages, aiming to expand single-family and multifamily housing supply: $101 billion insurance in force.
- Government National Mortgage Association (Ginnie Mae) administers mortgage support systems at interest rates too low for private market, attracts private money to mortgage market with guarantees based on specially designed government security: $86 billion since 1969.
- Urban homesteading, run by cities, sells HUD-acquired houses for $1 or simi-

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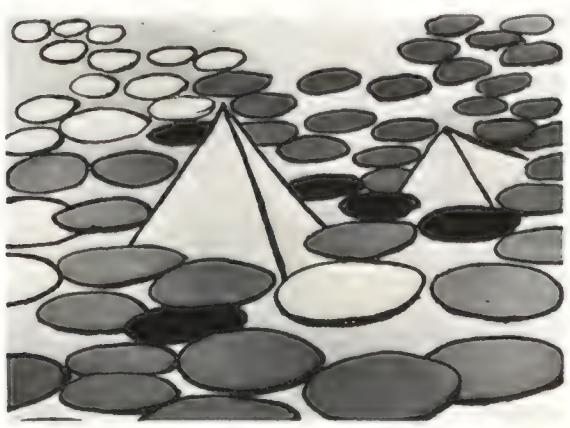

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lar nominal sum to low-income people who agree to rehabilitate and live in them. Program value: $20 million.

• Also, many design and neighborhood-assistance programs. HUD employs 4,700 people in Washington, 12,700 in the field. Budget authority: $33.3 billion.

Labor The Comprehensive Employment Training Act (CETA) provides money to cities and counties to pay for hiring and training unemployed, "economically disadvantaged" people. Approximately $11 billion authorized.

Treasury Under general revenue sharing (due to expire in 1980), financially strapped cities get money for revitalization work, using a complicated formula based on taxes, per capita income, population and intergovernmental transfers of funds. $6.8 billion distributed in fiscal 1979 for 39,000 governmental units.

Transportation Gives capital grants and operating aid for improving mass-transit systems: $3 billion.

Commerce The department's Economic Development Administration seeks job creation via grants and loans in depressed areas: $587 million.

General Services Administration, which spends an estimated $500 million a year to provide space for federal agencies, is giving preference to central business districts in distressed areas, thus bringing in jobs and stimulating economies, often renovating and preserving historic buildings in the process.

Interior Heritage Conservation and Recreation Service runs, with Internal Revenue, a tax-incentive program encouraging owners to rehabilitate income-producing properties with historic designations: $375 million (some of which goes for related new construction).

Health, Education and Welfare Contributes to revitalization by spending $60 billion or 32 percent of its budget in core cities, where 30 percent of the nation's population lives, on programs to help the poor. "Title 20" allocates money via the states for public and private social service programs; health programs upgrade outpatient and emergency rooms and clinics, get physicians into inner city neighborhoods; urban initiative in education helps the disadvantaged.

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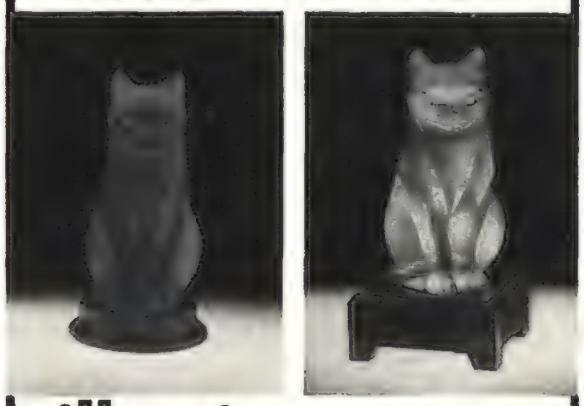

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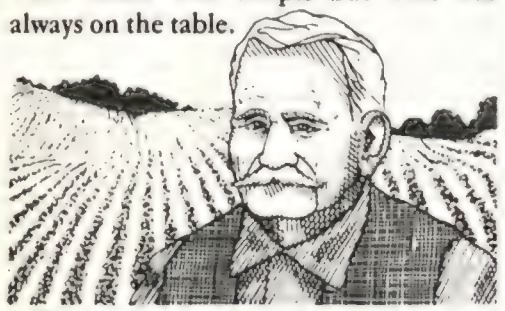
Lorenzo

In this first of a series on making wine, I want to explain how the Sebastianis became a wine-making family. I have to begin in the mid-1800's with my great-grandfather, Lorenzo, a peasant farmer near Lucca in the Tuscany region of northern Italy. He and my great-grandmother, Sabina, supported their family with a few chickens and a small vegetable garden. Their meals were simple but wine was always on the table.



Tuscany was rich with vineyards and wine was a part of just about everyone's life. Lorenzo never had the opportunity to learn the vintner's skills but it was not for lack of desire. His love of good wine and respect for those who made it was passed on to his son, Samuele, who, as a boy spent much of his time at a nearby monastery watching and helping the monks tend their vineyards and create their wines. Here he learned the techniques he would later bring to America and eventually pass along to his son, August.

Lorenzo and his love of good wine inspired the course our family has followed for three generations — passing from father to son a wealth of accumulated knowledge.

If you'd like to hear more from the wine country on a regular basis, please write for our free monthly newsletter.

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H1

than $4 billion, helps communities clean up waste-water discharges, with emphasis on upgrading existing facilities.

Federal Home Loan Bank Board Has a new Community Investment Fund ($10 billion over five years) to encourage Savings and Loan associations, which the Board regulates, to get involved in community revitalization.

Community Services Administration Channels federal funds through almost 900 local organizations to reduce poverty through community action, economic development, supports some 40 community development plans in areas private capital won't touch: $600 million a year.

Small Business Administration A program to shore up small firms in declining but still revivable neighborhoods, it is aimed at lending them $200 million a year in public and private financing.

National Endowment for the Arts A "livable cities" program gives matching grants for studies on neighborhood improvement, long-range city design, commercial revitalization: $940,000.

QUASI-PUBLIC SOURCES

Federal Home Loan Mortgage Corporation (Freddie Mac) Owned by the Federal Home Loan Bank System—which in turn is owned by the Savings and Loans—is a secondary mortgage market with a $13 billion portfolio, and has just received Congressional authority to get involved in property improvement loans as well.

Neighborhood Reinvestment Corporation Manages the Neighborhood Housing Services, now in 56 cities. These are partnerships among residents, financial institutions and local government, formed to make money available for housing rehabilitation: $8.5 million appropriated.

PRIVATE NONPROFIT SOURCES

Urban Institute Using government contracts and foundation grants, it does research on housing, public transportation, welfare reform, fiscal problems of cities: approximately $11 million in 1978.

National Trust for Historic Preservation Has a revolving fund for low-interest loans ($25,000 to $50,000) for improvements in low-income neighborhoods, is a clearing house for neighborhood conservation information and, through six regional offices, offers a variety of services to preservationists. Forty-three percent of

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If any one word describes the forests of New England, it's one used more by poets than foresters: eternal.

For the surprising fact is that the forests look much as they did when the first Pilgrims landed 350 years ago and saw trees covering virtually all of New England. Most of that varied, colorful, and uniquely beautiful forest is still there. In fact, 81 percent of New England is commercial forestland.*

The New England forest endures because, unlike most other natural resources, trees are renewable. And that's important, not only for the endless variety of products we need from the forest — wood for houses, pulp, paper, packaging and by-products — but for the forest itself. A cool, green haven for wildlife in the spring. And, in the fall, a dazzling show of color that draws thousands of tourists.

For centuries these forests regenerated themselves naturally. But for some time, New England's commercial forests, along with those of the rest of America, have not been producing as much wood each year as they could. And in view of increasing pressures on our forests, this is a matter of concern to all of us. The government says domestic demand for wood and paper products will double by the year 2020. And other demands on the forests are rising too — for recreation, wildlife habitat, watersheds.

So every acre of productive forestland is going to have to work even harder.

It's encouraging, therefore, that New England forest productivity is now improving.

The forest industry has learned how to grow more trees, faster, and in such a way that everyone can share in the multiple benefits of the forest.

It's a constantly improving cycle: growing, thinning, harvesting, and regrowing.

Each new forest is stronger, healthier, as forest technology advances.

As a result of genetic research, trees are "bred" to grow taller, faster, resist disease, and bud late in spring to avoid frost damage.

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So there's progress in the New England forest and all across the country. But we still have a long way to go.

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**Commercial forest is forest capable of, and potentially available for, growing trees for harvest.*

American Forest Institute

These two white pine slices are shown about 85 percent of actual size. Both are 13 years old. The difference is the small one grew in a crowded thicket, while the large one grew in a managed forest where it had plenty of room.

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But Acorn is just as concerned with the practical as with the beautiful. And there's no better proof of this than our approach to energy conservation. Here are some "for instances":

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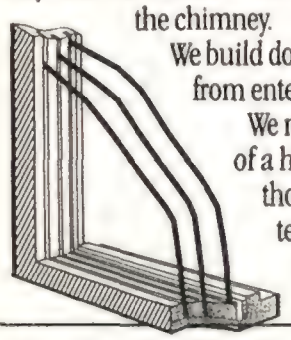
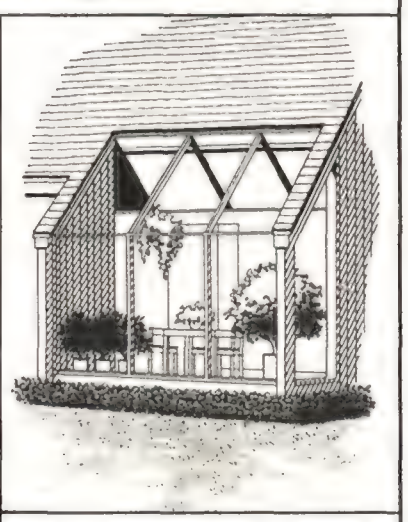


We build double entry-ways that prevent cold air from entering and warm air from escaping.

We maximize glass on the south-facing side of a house and minimize it on the others. And though most home manufacturers are content to use double-glazed glass, we recommend triple-glazing – except on the south side. Because our studies have shown that on the south side alone, energy allowed into the house by double-glazing outmeasures what is lost.

At the bottom of it all – a heat collector. Every Acorn can be built with a thermal slab which absorbs heat during the day, retains it for a calculated number of hours and releases it at night (when the temperature drops). It's relatively inexpensive to build; and even better, it's a one time expense that saves energy year after year.



Solar house: some down to earth talk. The features just described are known technically as passive energy conservation. If you want more, the next logical step is active solar heat collection. Acorn's own Sunwave® solar system doesn't need special fluids or special maintenance. It's simple to install, simple to operate and simple to understand. We'll be happy to send you details.

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its operating budget of $10.7 million comes from matching grants appropriated by Congress.

National Urban Coalition Through a network of 35 affiliates, it concentrates on job-stimulation and improvement of public education, seeks to fight redlining, disinvestment and displacement, encourage reinvestment. Budget: approximately $3 million a year.

National Center for Urban Ethnic Affairs Founded in 1970 by Msgr. Geno Baroni, now of HUD, to combat discrimination, disinvestment, drug abuse and kindred problems. It works with 300 groups in 55 cities: $2 million.

Brookings Institution Probes urban ills, suggests alternative treatments, evaluates federal programs for coping with urban decay, points new directions in community development: $672,000.

Rand Corporation Researches changing patterns of neighborhood composition, effects of government policies on urban housing, fiscal and economic problems. Aims to foster more effective, equitable aid to cities: about $400,000 a year in government and foundation grants.

The Conservation Foundation Sponsors conferences, does research, and publishes studies on neighborhood conservation as part of program of land use and urban growth. Total budget: $354,000.

National Urban League Approximately $250,000 of its general funds are devoted to defining issues and developing strategies to combat inner city social ills. Implementation is through four regional offices and network of 115 local affiliates.

PRIVATE AND FOR PROFIT

Federal National Mortgage Association (Fannie Mae) Is the biggest single supplier of funds for residential mortgages, with a $40 billion portfolio. It has a $700 million program for investment in older urban neighborhoods.

The National Housing Partnership The largest private producer of low- and moderate-income housing. Some 270 corporations and labor unions committed $42 million to start it; today it is involved in $1.4 billion worth of projects.

In addition, myriad professional, governmental and membership associations all pitch in with research, grants and loans, lobbying and technical assistance.

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VOLKSWAGEN DOES IT AGAIN

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By Thomas S. Ray jr.

Slow-motion world of plant 'behavior' visible in rain forest

Tropical vines change their forms—and their strategies—sometimes even reaching out for the darkness

Strands of monkey ladder vine mimic sculpture as they reach toward light in Costa Rica rain forest. Ruffly bark of vine supposedly makes it easier to climb.

Sheer diversity and a degree of adaptation unimagined at temperate latitudes help produce the stunning effect a tropical rain forest—the jungle we fantasize—has on the first-time observer. Panama, for example, is smaller than South Carolina, yet contains more species of trees (and birds and many other groups) than all of North America north of Mexico.

The high diversity is qualitative as well as quantitative. Adaptations occur in the tropics that simply do not occur in temperate zones. These adaptations, sometimes unexpected, sometimes bizarre, inevitably provoke the curiosity of the researcher. During several years of work in the rain forests of Costa Rica, my own curiosity was aroused by the adaptations of vines—adaptations so unusual as to alter my thinking about plants.

In the tropics vines are ubiquitous, and have rarely been better described than by Henry Walter Bates in 1863: "The tree trunks were only seen partially here and there, nearly the whole frontage from ground to summit being covered with a diversified drapery of creeping plants, all of the most vivid shades of green; scarcely a flower to be seen, except in some places a solitary scarlet passion-flower, set in the green mantle like a star."

Since 1974 my colleagues and I have tried to unravel the life histories of these specialized plants and their relations to the rain forest around them. Starting with fragile seedlings in the litter of the forest floor, we have followed them into the canopy 80 to 100 feet overhead. Returning several times to Costa Rica, we have become accustomed to trusting our lives to a rope, joining the birds and epiphytic orchids in the treetops to see how vines succeed in the most competitive environment on Earth.

It is my contention that, to better exploit their fellow plants, vines have evolved an elaborate behavioral repertoire. Few biologists consider plants to exhibit any behavior at all, and with good reason. The notion of behavior is closely linked to movement, something rare in plants. However, it cannot be said that plants are incapable of movement. As Charles Darwin pointed out in *On the Movements and Habits of Climbing Plants*: "It has often been vaguely asserted that plants are distinguished from animals by not having the power of movement. It should rather be said that plants acquire and display this power only when it is of some advantage to them; but that this is of comparatively rare occurrence, as they are affixed to the ground, and food is brought to them by the wind and rain."

A vine starts its life as a seed, which may be dispersed by a bird or bat, but which germinates on the ground. It matures and fruits, completing its life cycle, in the top of a tree where light levels are high. The tree is often far from the site

of germination; the plant may well have spent most of its life wandering through the forest in search of a suitable site for flowering.

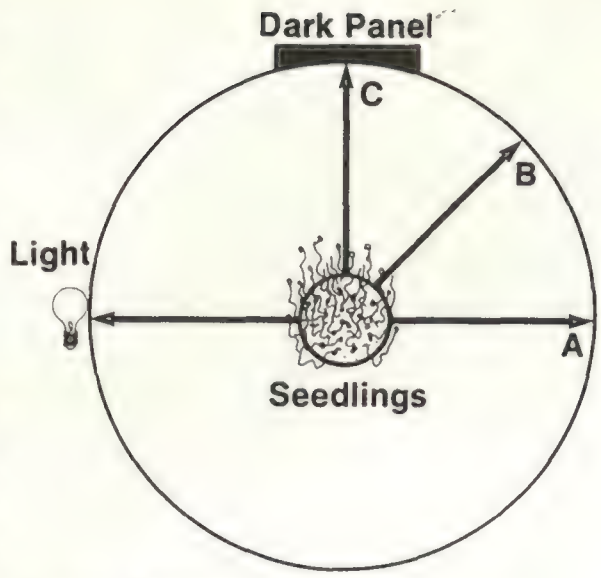
Aroid vines (those in the family of Araceae) are characteristically unbranched; the stems are linear in shape. They grow at one end while gradually dying off at the other as a result of senescence. In an accelerated time frame they would appear somewhat like green leafy snakes moving through the forest. But there is something very different about the movement of the plant "snake." While the body of the plant becomes displaced over time, no part of the plant actually moves (there is reason to believe, however, that some nutrients are removed from senescent leaves and transported through the stem to be used in the formation of new leaves at the growing end).

Mobility in any organism creates the need for orientation. Vines need an efficient way of getting from their site of germination to the sunlight high in the trees. This can be thought of as a two-step process. First the vine must encounter the tree, and only then may it climb up into the light. The former process is the more interesting, as the latter can be effected by simply clinging to a tree and growing up the trunk.

To understand the problem of finding a tree, imagine yourself to be a seedling on the shady forest floor. Looking around, you see the light-green canopy above, and silhouetted against this are the long dark tree trunks. The key word here is dark. An efficient way of getting to the nearest tree is to grow toward darkness, a response called skototropism that is very unusual for organisms that depend directly on solar energy. Skototropism in plants is well developed only in vines, and it expresses itself only when the vine is "searching" for a tree. Once the tree is found, the plant switches back and starts growing toward light.

Skototropism can produce a spectacular visual effect on the forest floor. *Monstera gigantea* fruit contain thousands of seeds, and when the fruit ripens, the seeds are scattered on the ground beneath the parent plant. The seeds germinate immediately, forming slender green leafless sprouts which can grow up to a meter in length as they search for a tree. The seedlings may occur in great densities around a tree bearing a mature plant, and will all grow toward the tree, appearing like short green spokes of a wheel against the brown leaf litter, with the tree like an axle joining the wheel at the hub.

A graduate student at Harvard, the author has been studying the ecology of vines in Costa Rica for five years.



In this diagram of vine experiment, seedlings head straight for dark panel, C. They did not simply grow away from brightest light, as in A, nor did they avoid the average lightest area, as in B. Most plants grow straight toward light.

Skototropism has a very short etymology, beginning in 1974 when Donald R. Strong jr. and I discovered the phenomenon in Costa Rica. A tropism is an organism's characteristic of growing in the direction of something it needs, such as light or water. But this tropism was so different from any other that we felt the need to give it a new name. We finally settled on *skotos*, the Greek word for "darkness, gloom" and formed the word skototropism—growth toward darkness.

The phenomenon is not simply negative phototropism, growth away from light. This can be shown by a simple experiment in which vine seedlings are placed in the center of a circular arena (above). The arena consists of a wall of white cardboard. At one place on the wall a black felt strip is attached. At an angle of 90 degrees from this black strip, the wall is cut away and replaced by a translucent panel; a light is placed behind it.

I can conceive of three different directions the seedlings might grow. The plants might, in effect, take account of the light coming from all directions. Because the side of the arena containing the black panel would be darker, seedlings would be attracted in that direction; but they would also seek to avoid the bright light source itself, and so would grow off at an angle toward the dark side of the arena. Alternatively, the seedlings could grow directly away from the light source, or directly toward the dark panel.

Therese Gurski, a junior at Lourdes High School in Chicago, has completed the experiment as a science fair project, under my direction. Her results show unambiguously that the *Monstera gigantea* seedlings headed straight for the dark panel, almost as if they had a mechanism for focusing the light, and could "see" where they were going. To find a tree in the forest, the seedlings must grow toward discrete sources of darkness.

The philosopher class

I have only been able to find one reference to the kind of movement that I have observed, in a passage by Ambrose Bierce, a dialogue on whether machines—and plants—can think. The protagonist asks: "'And what, pray, does it [a machine] think with—in the absence of a brain?'

"The reply coming with less than his customary delay, took his favorite form of counter-interrogation:

" 'With what does a plant think—in the absence of a brain?'

" 'Ah, plants also belong to the philosopher class! I should be pleased to know some of their conclusions; you may omit the premises.'

" 'Perhaps,' he replied, apparently unaffected by . . . irony, 'you may be able to infer their convictions from their acts. I will spare you the familiar examples of the sensitive mimosa, the several insectivorous flowers and those whose stamens bend down and shake their pollen upon the entering bee in order that he may fertilize their distant mates. But observe this. In an open spot in my garden I planted a climbing vine. When it was barely above the surface I set a stake into the soil a yard away. The vine at once made for it, but as it was about to reach it after several days I removed it a few feet. The vine at once altered its course, making an acute angle, and again made for the stake. This manoeuvre was repeated several times, but finally, as if discouraged, the vine abandoned the pursuit and ignoring further attempts to

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divert it traveled to a small tree, further away, which it climbed.'

" '*And* all this?'

" '*Can* you miss the significance of it? It shows the consciousness of plants. It proves that they think.' "

The movement of the leafy "snake" creates an interesting problem. The plant grows across great distances, encountering widely varying microenvironments, from the cool dark of the forest floor where debris falling from the treetops creates a high risk of mortality, to those treetops where the fresh air and bright tropical sunlight provide a benign atmosphere. The plant must be adapted to all of the conditions that it encounters. At the same time, every part of the plant remains fixed and thus must be highly fit in whatever surroundings it finds itself. A vine might adjust to this life history by evolving a form that is universally adapted, having a high fitness in the various microenvironments. Or it might evolve flexibility, so that it may express a different form in each habitat. Thus each part of the vine would assume the form which is best designed for the microenvironment in which it must live. The latter approach is what we actually see in tropical vines.

Author's colleague, Don Strong, shoots light line over a branch in tall tree.

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With climbing ropes in place, author pulls himself up toward the canopy.

To really understand how this works we must look closely at how vines are constructed. Aroid vines are composed of segments placed end to end. The segments consist of a piece of stem with a leaf and a pair of rootlets attached at the forward end. The segments are produced one at a time, at the growing end of the vine. The precise size and shape of each segment can vary widely in response to the type of environment in which it is being formed.

As a rule, vines make thicker segments in better environments. The ground is clearly the worst environment in the rain forest for a plant, because of the low light levels and falling debris. In *Monstera gigantea* the terrestrial segments are the smallest. The lower part of tree trunks is a habitat of intermediate quality. A vine on a tree has escaped most of the danger from falling debris, but on the lower part of the trunk the leaves are still shaded by the many layers of vegetation above. Here the *Monstera* assumes medium stature.

If the vine reaches the higher part of the tree trunk, it has found the best conditions. In the presence of full sunlight and fresh air, and with the support of a sturdy tree trunk, *Monstera gigantea* will undergo a transition in form that reflects its name. The stem grows and the leaves expand to a length of two meters, com-

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Elmer's Tune (Lawrence Welk Orch.)
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Little Brown Jug (Glenn Miller Orch.)
That Old Devil Moon (Johnny Desmond)
Somebody's Taking My Place (Ted Weems)
Sophisticated Lady (Duke Ellington Orch.)
Wish You Were Here (Judy Garland)
Don't Squeeze Me (Lena Horne)

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SONGS (ARTIST)

Velvet Moon (Harry James Orch.)
I Wonder Why (Bing Crosby/Judy Garland)
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Habanera (Glenn Miller Orch.)
Perfidia (Billy Daniels)
If I Had You (Benny Goodman Orch.)
Red Sails in the Sunset (Sportsmen)
Swing Low (Tommy Dorsey Orch.)
People Will Say We're in Love (Kate Smith)
Rock-a-Bye Basie (Count Basie Orch.)

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SONG (ARTIST)

You Do Something to Me (Frank Sinatra)
Kalamazoo (Glenn Miller Orch.)
All of You (Johnny Desmond)
Me and My Shadow (Shep Fields Orch.)
Music Maestro Please (Tommy Dorsey Orch.)
All or Nothing at All (Billy Daniels)
Oh, Look at Me Now (Dick Haymes)
At Last (Glenn Miller Orch.)
Coffee Time (Les Brown Orch.)
But Not Like You (Benny Goodman Orch.)
Sunday Kind of Love (Anita Ray)
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I've Got the Sun in the Morning (Bing Crosby)
This Love of Mine (Tommy Dorsey Orch.)
Linger Awhile (Shep Fields Orch.)
The Man With a Horn (Harry James Orch.)

SOUNDSTAGE VII

SONG (ARTIST)

Say It Isn't So (Ted Weems)
Rock-a-Bye Your Baby (Judy Garland)
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Maria Lena (Tommy Dorsey Orch.)
April in Paris (Count Basie Orch.)
The Poor People of Paris (Lawrence Welk)
Don't Worry 'Bout Me (Mel Torme)
Poor Butterfly (Benny Goodman Orch.)
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Isle of Capri (Shep Fields Orch.)
Sentimental Journey (Les Brown Orch.)
American Patrol (Glenn Miller Orch.)
Peanut Vendor (Stan Kenton Orch.)
Just You, Just Me (Frank Sinatra)
My Heart Stood Still (Dick Haymes)
Frenesi (Al Goodman Orch.)

SOUNDSTAGE VIII

SONGS (ARTIST)

Serenade in Blue (Glenn Miller Orch.)
When My Sugar Walks (The Sportsmen)
So Far (Dick Haymes)
Prelude to a Kiss (Duke Ellington Orch.)
Stompin' at the Savoy (Benny Goodman Orch.)
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Got the World on a String (Bill Daniels)
A Fine Romance (Shep Fields Orch.)
Blue Moon (Les Brown Orch.)
Cherokee (Charlie Barnett Orch.)
Full Moon Empty Arms (Lawrence Welk Orch.)
I Know Why (Glenn Miller Orch.)
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Jeepers, Creepers (Louie Armstrong)
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SOUNDSTAGE IX

SONGS (ARTIST)

I Found A New Baby (Benny Goodman Orch.)
I've Got My Love To Keep Me Warm (Les Brown)
I'll Never Smile Again (Tommy Dorsey Orch.)
Let's Put Out the Lights (Shep Fields Orch.)
I Can't Believe That You're In Love (Mel Torme)
After You've Gone (Benny Goodman Orch.)
Blue Champagne (Glenn Miller Orch.)
Stardust (Al Goodman Orch.)
Sleepy Time Gal (Harry James Orch.)
Hold Tight (Andrews Sisters)
Tenderly (Kate Smith)
I Can't Get Started (Johnny Desmond)
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Claire De Lune (Glenn Miller Orch.)
This Time the Dream's on Me (Dick Haymes)
Chasing Rainbows (Lawrence Welk Orch.)

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SONGS (ARTIST)

Ten O'clock Jump (Count Basie Orch.)
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Monstera gigantea seedlings, left, head for the tree trunk in background. Climbing the tree, center, they develop small leaves. At the top of the tree, vine produces frondlike leaves and fruit (right).

pletely changing their shape and coming to resemble enormous fronds (above). This behavior is understandable in that a plant that is capable of moving from a poor to a good environment would not be likely to invest its precious resources in constructing a full-sized plant body in the worst of environments.

Variation in shape can be understood even better by looking at the genus *Syngonium*. The shape of the leaf is more uniform, but the significance of changes in the relative size of leaf and stem is more obvious. Two segments of exactly the same weight may look totally different: one with a long stem and small leaves, the other with a short stem and very large leaves.

The first form, the long stem, is one adapted almost entirely for "movement." A segment with 95 percent of its material in a long stem and only a vestige of a leaf is barely able to photosynthesize, but the plant has moved forward a distance equal to the length of the stem. A segment which has placed 95 percent of its material in a large leaf, with an extremely short stem separating it from the previous leaf, has created a large apparatus for gathering light, while the plant has moved forward only slightly.

In a good environment, *Syngonium* segments naturally specialize for "feeding"—and for immobility. They put most of their substance into large leaves not only to take advantage of abundant sunlight, but to reduce forward motion to a minimum so they will not carry themselves out of the good environment.

Segments in a poor environment have a more interesting problem. They must move, but they also have to "feed" themselves. So several contiguous segments will take on the leafy form to gather what sunlight there is. The next group assumes the long-stemmed form, to make the maximum forward progress. The pattern cycles back and forth until the vine encounters a tree.

This division of labor is repeated when a vine climbs a small tree, only to find it is shaded by taller trees. When the top of the tree is reached, the plant has not yet found the high light levels that it needs to fruit. Generally the vine branches at this point. One stem will remain in the tree while the other returns to the ground in search of another tree. The stem in the tree continues to make relatively large leafy segments, while the stem that has returned to the ground makes long slender leafless segments. The stem in the tree is carrying on the photosynthesis needed to support the stem searching for another tree. If the searching stem is broken off from the stem in the tree, it will produce its own leaves, and behave like the free living terrestrial form described earlier.

This example illustrates how a moderately large arboreal vine can be transformed to a smaller terrestrial form similar to the one it took much earlier in its life. The development of vines is not unidirectional. The vine is not genetically programmed to produce a progression of forms leading it directly from the seedling to the mature fruiting plant.

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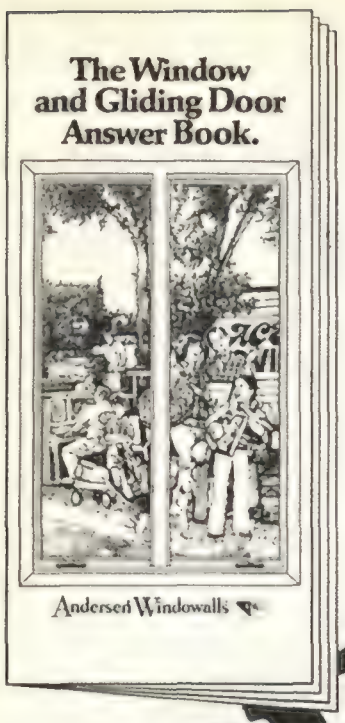

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A poisonous snake, caught in a loop, unexpectedly joined author in treetops.

Rather, the series of configurations expressed is entirely dependent on the sequence of environments that the vine encounters as it moves through the rain forest. No two individuals will show precisely the same series of shapes.

"Genetic individuals" are capable of being broken up into many independent "physiological individuals," each of which will have a different history. Thus the fate of a seedling can be quite complex. Even after reaching a large mature fruiting form, an individual may become transformed into a small terrestrial plant resembling a seedling. This may happen when the plant grows off the top of the tree and returns to the ground as described before. It may also happen if the vine is blown out of the treetops by a storm or falls with a broken tree branch. After being moved to the forest floor, subsequently produced segments will take on the configuration appropriate for that environment. The vine retains complete flexibility of form throughout its life.

In short, vines move through their rain forest habitat with a high degree of orientation, "searching" for trees to climb and then "seeking" light. As they encounter different environments, they assume different shapes. The changes in form directly affect the amount of photosynthesis that takes place. Thus the plant remains finely tuned to its environment and maintains a high fitness throughout its journeys.

Is it appropriate to speak of "plant behavior?" This interesting semantic question impinges on how we see the world as animals. There is a division of opinion on the matter, and the line is not drawn neatly between botanists and zoologists, but rather along philosophical grounds. There are those who feel that behavior requires the existence of a nervous system, an adaptation that is unique to the animal kingdom.

On the other side there are those who believe that plants have been misunderstood by us animals—that we lack sensitivity to the ways of plants. For example, awareness, in humans at least, takes place on a much faster time scale than the behavior described in this article. In an accelerated time frame one could not help but notice a vine's highly oriented growth movements, and the changes in form in response to environmental qualities. One would surely be compelled to categorize such actions as behavior.

Ultimately, the semantic question can be settled by agreement on a carefully thought-out definition of the term. Yet the argument will persist until we broaden our ways of thinking in an effort to understand the nature of plants. Perhaps then we may even admit them to the "philosopher class."

No longer an arboreal species, biologists use safety devices in case they fall.

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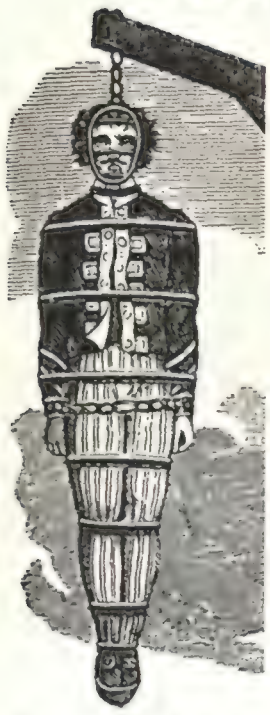

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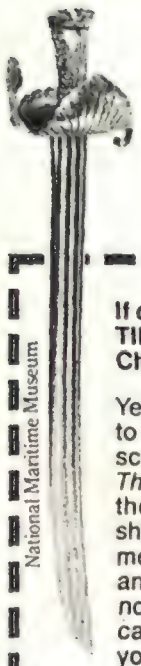

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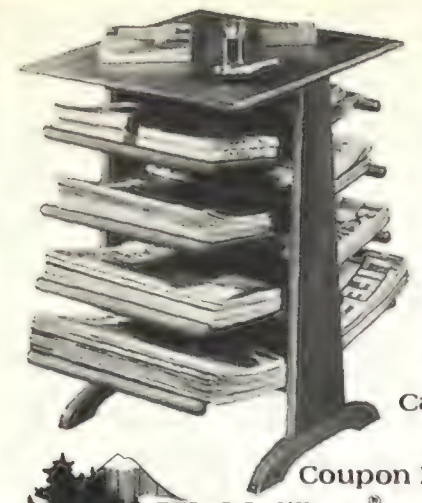

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Book reviews

Orient Express: The Life and Times of the World's Most Famous Train
E. H. Cookridge
(Random House, $12.95)

If trains are often symbolic of civilization —the iron horse of the American West, for instance—then this is the story of a pinnacle of Euro-Asian refinement. E. H. Cookridge has created in these pages a hearty stew of anecdote, history, tradition, romance and intrigue, all of which cater delightfully to our preconceptions of the Orient Express.

Perhaps the saddest aspect of Cookridge's tale is that it has, indeed, an end; that this greatest of trains became outmoded. Certainly, travel-agency re-creations of the Orient Express can only emphasize the nostalgic portent of the passing of this prime route to the Mysterious East. Thus, Cookridge's history becomes an elegy; there is something very British in his tacit mourning of old ways outmoded, in his barely disguised contempt for the lack of civilisation that today makes so very much of our poor planet unlivable.

This sadness is tempered, however, by Cookridge's storytelling skills and his obsessive belief in the knights and damsels of a transitional era in world history, before cloak-and-dagger became merely soaked-and-haggard. The story of the Orient Express is effectively the story of one man's dream and the grand manner in which it survived him. Georges Nagelmackers, born into a Belgian banking house with ties to the throne, pursued his Pullman-inspired idea for a trans-European express over perilous rights-of-way, shaky roadbeds, diplomatic crises and a difficult partnership with an American entrepreneur, Colonel William d'Alton Mann. Nagelmackers' Compagnie Internationale des Wagons-Lits appended "et des Grands Express Européens" to its name on October 4, 1883, when pomp, circumstance and unprecedented luxury pulled out of Paris' Gare de Strasbourg at 6:20 P.M.—fashionably late.

Cookridge's main course is his reconstruction of that premier journey from Paris to Constantinople. The account is based primarily on the published memoirs of journalists Edmond About and Henri Opper de Blowitz—who established the precedent for intrigue by traveling to a secret meeting with the Sultan of Turkey —and it includes the sumptuous menus and magnificent wines served on the trip, as well as the details of a rain-soaked hike to have an audience with Charles I of Romania and the vagaries of the last leg to Constantinople—via steamship on the Black Sea.

Having established the train, Cookridge resorts to name-dropping as his formal plans seem to lose their definition; even timetables and endpaper maps are hard put to stem the tide of confusion, as Cookridge's catalog of patrons, rich, royal and mysterious, tends to leave the reader

Lounge-library of the Orient Express appeared to an artist in 1886 as sanctuary

somewhat dazed. What finally redeems the book is its minor parade of personalities—as opposed to names or titles—and Cookridge's admirably sustained treatment of the standards by which the Orient Express was run. Indeed, the Wagons-Lits staff is described in heroic terms, from the lowliest *plongeur* to the ambassadorial *chef de train*; their link to the English gentleman's gentleman is evident in their reassuring credo: *"Il faut être discret, monsieur."*

This attitude, this commitment to the comfort and privacy of the passengers, animated the opulent appointments of the first-class Wagons-Lits and made them a legend; it is the legend that finally sustains this history. This was the Orient Express: dining cars peopled by princes and spies; waiters in tails, velvet breeches, silk stockings and silver-buckled shoes; marooning blizzards; gourmands and brigands; assignations and assassinations.

It may be that the sleek Concorde will someday assume such an exalted place in world travel—though I suspect that it travels far too fast, allowing no time for scandal or intrigue to develop. *Sic transit gloria mundi.*

—Bill Bennett
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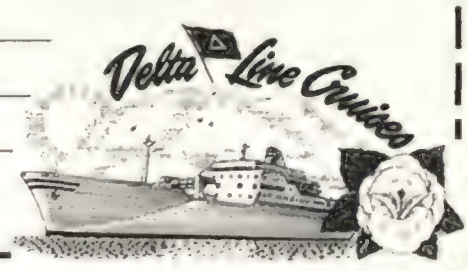

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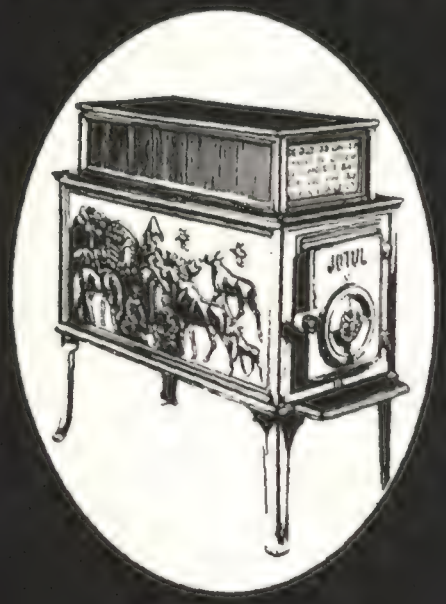

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Beyond the Magic Bullet
Bernard Dixon
(Harper & Row, $10)

Modern medical technology is assumed to be powerful enough to cure, ameliorate, even prevent disease through its magic bullets—its vast arsenal of drugs. Yet heart disease and cancer, two of the major causes of death, continue to take their toll and to frustrate medical-research efforts to find cures for them.

Bernard Dixon, editor of the prestigious British magazine *New Scientist*, explains what has happened to scientific medicine—and why it is failing now. Dixon begins by tracing the history of the quest for understanding diseases, beginning in ancient Greece with Hippocrates who, in the fifth century B.C., believed that the body was diseased when four basic organs (heart, brain, liver and spleen) got out of balance, and moving to 17th-century England where Thomas Sydenham radically announced that the malady is different from the sick person and that there are specific diseases.

The impact of Sydenham's observations was far-reaching: it led to a theory of specificity and to the scientific pursuit of seeking to control each specific disease. Over the centuries, the course of medical treatment has been dominated by this theory and, according to Dixon, it is the reason we find ourselves in trouble today. It is not that specificity is untrue but rather, says Dixon, "that the notion is simplistic, and that much more needs to be taken into account in delineating the essence of disease."

Behavior, Dixon notes, "has a real effect on individual susceptibility to disease. Mouth breathers . . . are more prone to respiratory infections" than people who breathe through their noses. Even the real cause of tuberculosis is not the tubercle bacillus alone but "the malnutrition, fatigue and other accompaniments of poverty which turn harmless parasitism into overt ill health."

Dixon makes a passionate plea for getting at the root of ill health. It might be more meaningful, he points out, to find out why coronary heart disease runs in families, rather than what causes it, especially since the latter question "has largely failed to provide useful information" about the disease or to change substantially the morbidity and mortality associated with it. For years, says the author, it

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was thought that after age 20, blood pressure rose gradually, "even in healthy people. In fact, recent studies in New Guinea and elsewhere have now established that blood pressure does not necessarily increase with advancing years in people living in simple, non-westernized societies." Perhaps what we thought was "normal is not normal at all, but stems from an adverse environment."

What, then, are we to do? Move to New Guinea? Coerce people into changing their life-styles? Both are unrealistic, unacceptable and unnecessary. Better health and better health care could be achieved by looking beyond the magic bullet: by getting rid of the myopia that drugs can cure everything when, surveys claim, four-fifths of the people seeking medical care have conditions that will clear up by themselves anyway.

The author is heartened by recent articles in the medical press by doctors wanting "more time to exercise their pastoral role . . . to mobilise their patients' own resources" rather than masking various symptoms with medication.

Dixon goes on to call for preventive measures, and for more rational use of magic bullets. He particularly attacks the inappropriateness of exporting some of the high medical technologies to Third World countries. Antidiarrheal drugs, for example, are popularly—and appropriately—taken by tourists as a "specific remedy for a *condition*, diarrhea," but they are not the answer to the diarrheal *diseases* that kill or debilitate so many young children in the Third World. Needed are clean water and sanitary conditions to stop the "transmission of bacteria and other enteric organisms" that are the cause of the infection.

"The most urgent and far-reaching choices in promoting health have little or nothing to do with scientific medicine," says Dixon. In his view, political and economic considerations are the key problems in medicine today.

In spite of these statements, *Beyond the Magic Bullet* is, curiously, no anti-medicine book. In fact, it illustrates the pivotal place of medicine in the world today. What the book does, however, is explain the limits of our current approach to medicine—and that should be of interest to readers who are concerned about the future of health care.

—Jane Stein
Author, *Making Medical Choices*

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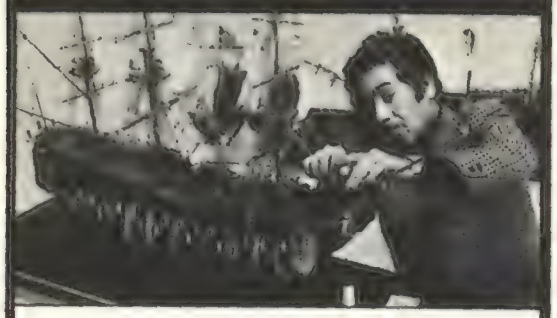

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The Run of the Mill: A Pictorial Narrative of the Expansion, Dominion, Decline and Enduring Impact of the New England Textile Industry
Steve Dunwell
(David R. Godine, $30)
Amoskeag: Life and Work in an American Factory-City
Tamara K. Hareven
and Randolph Langenbach
(Pantheon Books, $15)

America's Industrial Revolution started in New England in the years just after the country won its independence. New England possessed capital, know-how and energy—the waterpower that drove the mills that made the cloth from which the region prospered in the 19th century. The industrial communities that grew up along energetic stretches of the Merrimack, Housatonic, Shetucket, Blackstone and other fast-falling rivers often conformed to a millowner's paternalistic grand design for integrating and harmonizing workplace and dwelling place.

During the early, idyllic decades of industrialization, upright young Yankee women, recruited from the family farm, came to work for a few years for long hours (but good pay) in textile mills, whose owners provided them with supervised dormitories and assured their moral well-being. Improved technology, the influx of immigrant labor, and the demand for increased production and profits had changed all that by the time of the Civil War. Harmonious grand designs were forgotten by a new generation of millowners, who lacked any regard for the urban environment in which their fortunes were made for them. The textile industry flourished in the late 19th century, but, after the turn of the century, it became increasingly difficult for the New Englanders to compete with nonunionized, nonregulated mills in the South, where hours were longer, wages lower and machinery newer.

The New England mills began shutting down in the 1930s, a slow process that let hopes of a revival linger for years. Today, 40 years later, the old mill towns have become—according to Steve Dunwell in *The Run of the Mill*—"painful anachronisms" shrouded in "despair and decay."

The Run of the Mill is really two books. It is the history of New England's textile industry, illustrated by more than 250 prints, townscapes and photographs, including some by Lewis Hine (below), who waged war with his camera against child labor early in the century. But it is in describing the "disturbing present" that Dunwell, a journalist and photographer born and raised near a New York mill town, excels, interviewing and bringing his own camera into play to portray the living remnants of a dead industry. He makes one hear and see the pride that men and women who were weavers and loomfixers, kettlemen and millwrights, perchers and braiders still take in crafts they performed in now-idle mills. "My job is looking for trouble and eliminating it. That's how I get my satisfaction. All my life," says a weaver who retired after 50 years in the Fall River (Massachusetts) mills, "my whole object was to make a piece of cloth that was perfect. . . ."

The mills of the Amoskeag Manufacturing Company of Manchester, New Hampshire, were once the world's largest textile-making complex under one management. Modern and efficient in their best years, they lined two miles of the Merrimack and gave employment to 17,000 workers, largely French Canadians. The mills represented most of what life had to offer to these people—steady work and a source of identity.

The mutual trust that developed over the years between workers and management disappeared after World War I when Amoskeag's absentee owners determined to offer lower wages for longer hours in order to meet Southern competition. The long and painful strike that this action provoked in 1922 was a watershed in the company's history and in the lives of its workers and their families.

Perhaps even goodwill and fresh in-

Photographer-reformer Lewis Hine captioned this picture: "6 pm,

vestment couldn't have saved Amoskeag when the industry was on its last legs everywhere else in New England. Perhaps the corporate owners were merely bowing to the inevitable when they transferred their surplus capital to a holding company that left its textile-manufacturing subsidiary with hardly enough to maintain equipment and property. Additional strikes and serious flood damage sealed the fate of the mill, which shut down permanently in 1936.

In contrast with Dunwell's impressionistic use of oral testimony to give an overview of an entire industry, social historians Tamara Hareven and Randolph Langenbach, co-authors of *Amoskeag*, have included lengthy interviews with more than 30 people whose lives were intimately bound up with one company and one town.

Writers and publishers have shown growing interest in our industrial past which, one assumes, reflects a commensurate interest on the part of readers. Anthony Wallace's *Rockdale*, a fine study of early industrialization in Pennsylvania (SMITHSONIAN, June 1978), is an example of one of the best of this genre.

One by one the mills, rotting temples to the poet Whittier's "Divinity of Work . . . Gospel of Industry," fall victim to urban renewal—to be replaced by parking lots. People have moved away, like their jobs, and like their homes, grown old. We have a compelling need, filled by books like *The Run of the Mill* and *Amoskeag*, to tap these last memories of an epoch in American history before they are gone.

—Robert Rinehart
Historian, Foreign Area Studies,
The American University

May 25, 1909. Coming out of the Amoskeag Manufacturing Co., Manchester, N.H."

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French Impressionist Painting—April 1-6: Illustrated lectures and in-depth tours of the great works of Monet, Degas, Renoir and other masters in the outstanding collection of the National Gallery of Art.

The Arts of Japan—May 20-25: Architecture, painting, sculpture, and pottery from prehistoric times to the present with emphasis on the great philosophies, religions, and impact of other cultures. Includes films, tours of the renowned Freer Gallery of Art, and a tea ceremony at the Embassy of Japan.

Man's Quest for Wings—June 3-8: The wonders of aviation through the eyes of the eminent curators of the National Air and Space Museum. Includes tours and a day at Silver Hill (NASM's extensive preservation, restoration and storage facility) to view the world's finest collection of flight memorabilia.

Historic House Preservation—June 3-8: Nationally known preservation experts share their special expertise in lectures and tours of famous Georgetown, Alexandria, and outstanding private and historic properties of the National Trust for Historic Preservation.

Genealogical Research—June 10-15: Taught by leading authorities, participants learn how to conduct research in major repositories such as the National Archives, Library of Congress and D.A.R. Library.

China: A Cultural History—June 10-15: Prehistoric China to the enigmas of today, with emphasis on intellectual and artistic traditions and the great philosophies and religions. Includes recent films and tours of the outstanding collection of the Freer Gallery of Art.

Please send requests for full information on content, accommodations and fees by seminar title to: Selected Studies, A & I 1190A, Smithsonian Institution, Washington, D.C., 20560 or telephone (202) 381-6434 for details.

Smithsonian highlights

Masks impersonating supernatural beings and beasts (SMITHSONIAN, October 1978) are a continuing anthropological link with ancient heritages. Although they exist in most parts of the world, none apparently are produced in greater numbers or used with greater frequency than in Mexico. A year ago, the Smithsonian had but a handful of Mexican masks; today it has nearly 300. The windfall comes via a gift from the Mexican government of 74 contemporary masks (all now on view at the Renwick Gallery); a local donation of 40 additional modern papier-mâché carnival masks; and, most recently, the Institution's purchase of 185 dance masks from the distinguished collection of the late Donald B. Cordry, a foremost scholar of Mexican cultural material, and his widow Dorothy.

Most of the Cordry masks, now on view for one year at the Museum of Natural History, come from the state of Guerrero.

Some of them, like the diabolic fellow at the left, date from around 1850—if not much earlier. The tradition of masked dancing—far older than the Aztec culture—lives today in many local fiestas. While there may be bigger Mexican mask collections elsewhere, few are so varied, colorful and so thoroughly documented as the Cordrys'.

Fine rare mask, possibly devil character.

March special events

Anacostia Neighborhood Museum
"Out of Africa: From West African Kingdoms to Colonialization"—This new, yearlong show spans more than seven centuries of black history, from 1100 to 1861.

Arts and Industries Building
"Discover Puppets!"—"Christian the Wizard" (through March 11); "Fiddlers Folly" (March 14-April 1). Discovery Theater box office: (202) 381-5395.

Come Fly a Kite
Join the Smithsonian's annual kite-flying party at 10 A.M. Saturday, March 31, west side of the Washington Monument.

Cooper-Hewitt Museum (New York)
"MA, the Japanese Concept of Time and Space" (March 13-May 27)—An exploration of the ancient Japanese belief that time and space are inseparable and a concept basic to all the arts, from dance to architecture and gardening.

Freer Gallery of Art
- "Bronze Art of the Newar Buddhist Craftsmen of Nepal" (March 13, 8:30 P.M.)—Professor Clifford R. Jones, Columbia University, lecturer.
- "Four Guardian Kings from the Kamakura Period" (through April 16)—This rare set of 14th-century Japanese sculptures is focal point of a newly installed gallery of Buddhist and Shinto art.

Hirshhorn Museum & Sculpture Garden
- "Calder's Universe" (March 15-May 13)—More than 125 works from the 50-year career of the renowned American artist.
- "David Hockney: Travels with Pen, Pencil and Ink" (March 29-June 10)—The first comprehensive U.S. exhibition of this British artist's (p. 144) elegant observations of people, places and objects.

Museum of History and Technology
- "Einstein: A Centenary Exhibition" (March 3, for a year)—Nearly 100 documents and artifacts mark the centennial of the great physicist's birth (SMITHSONIAN, February 1979).

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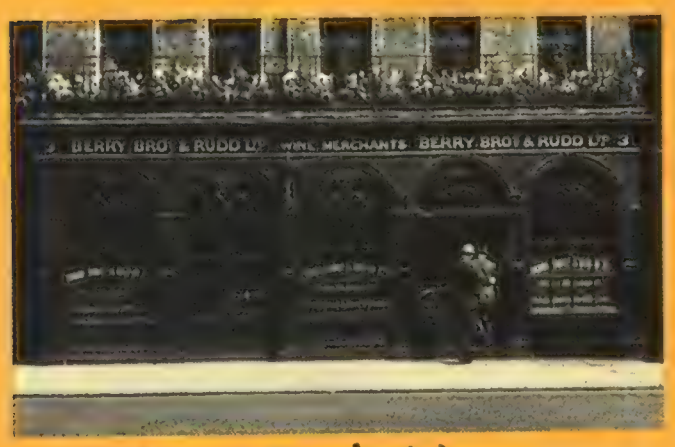

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Portrait of Hockney traveling.

• "Japanese Medicine and Pharmacy" (through July)—The graphics of traditional Japanese medicine.

Museum of Natural History
• "St. George and the Dragon"—See "Around the Mall and beyond" (p. 10).
• "Alaska's Native People" (March 24-May 20)—Oil paintings by Lunda Hoyle Gill, of McLean, Virginia.
• "Papaws, Pitcher Plants and Peregrines" (March 19, 5:45 P.M.)—Slide lecture by Stanwyn Shetler, Smithsonian botanist, illustrates superb diversity of spring wild flowers and birds. Baird Auditorium.
• "Research on Bromeliads"—This exhibit shows results of Smithsonian scientific research with South American tropical plants.

National Air and Space Museum
"Einstein's Vision and the Discovery of the Expanding Universe" (March 14, 8 P.M.)—P. James E. Peebles, of Princeton University, is lecturer.

National Collection of Fine Arts
• "Gabor Peterdi: Forty-Five Years of Printmaking" (March 9-April 29)—Prints from 1934 to today by a dean of American printmaking.
• "Seymour Lipton: Aspects of Sculpture" (March 16-May 6)—Nearly 55 works by a surviving giant of the modern movement.

Renwick Gallery Traveling Exhibitions
• "The Decorative Designs of [Architect] Frank Lloyd Wright" (March 23-May 6)—Atlanta's High Museum of Art.
• "Craft Multiples" (through March 23)—Valdosta (Georgia) State College.

Smithsonian Division of Performing Arts (202-381-5395)

• "Music from Marlboro" (March 3, 5:30 P.M.)—Chamber-music masterpieces played by young artists. Baird Auditorium.
• "Sunnyland Slim" (March 4, 8 P.M.)—Traditional blues by a superlative pianist-singer. Baird Auditorium.
• "Smithsonian Chamber Players" (March 5, 6, 8 P.M.)—Guest artist: soprano Carole Bogard. History and Technology's Hall of Musical Instruments.
• "Ruby Braff" (March 11, 6 P.M.)—For lovers of mellow, pungent trumpet sounds. Hirshhorn Auditorium.
• "20th Century Consort" (March 18, 7 P.M.)—Concert at Hirshhorn (open rehearsal March 17, 3:30 P.M., at Baird).
• "Yakshagana" (March 22, 8 P.M.)—The colorful dance-drama of South India (p. 68). Free demonstration, March 21, 1:30-4 P.M. Both at Baird Auditorium.
• "Sons of the Pioneers" (March 25, 8 P.M.)—Those singing cowboys of the old

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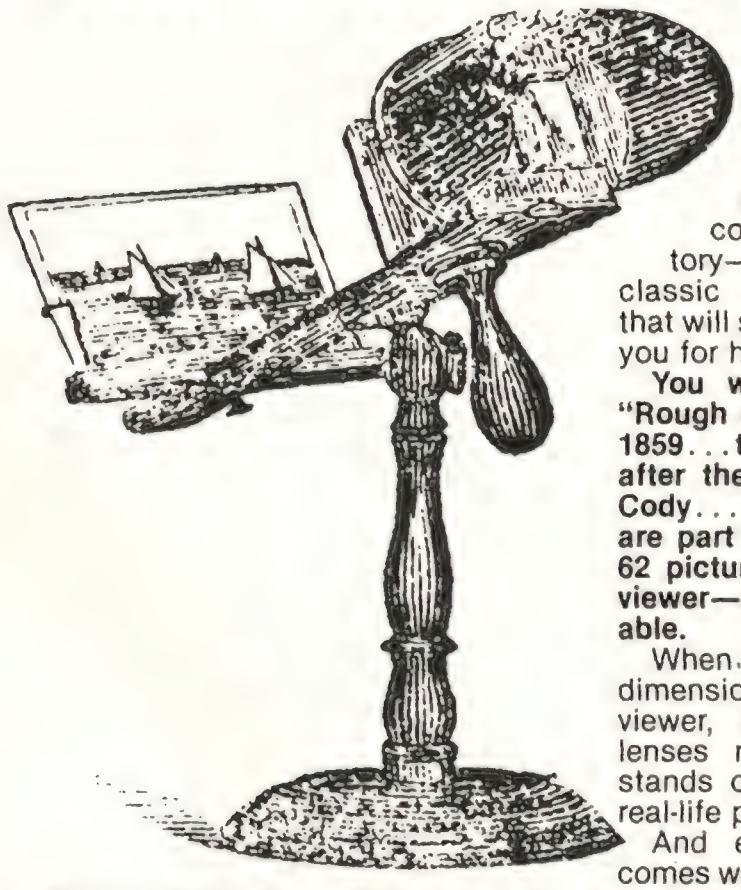

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It takes time—lots of it—to get permits . . . especially when the process is deliberately used as a weapon in efforts to block projects. Now planners must allow eight to 10 years for constructing a coal-fired station that, a decade ago, could be completed in three to four years.

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Not only will today's construction delays cost consumers billions tomorrow—yes, *billions*—but they're robbing our nation of its ability to meet future energy demand, a matter of gravest concern.

We're not saying, "Down with regulation!" —far from it. A nation such as ours, as utterly dependent on energy as ours, *must* regulate its utility industries . . . sensibly. But let's be aware that regulation, like everything else, bears a price tag.

Let's not keep raising the price.

Commonsense regulation is in the public interest. Overregulation is not.

A message from the nation's consumer-owned, nonprofit electric cooperatives and power districts.

America's rural electric systems

For more information, write: Dept S, National Rural Electric Cooperative Association, 1800 Mass. Ave., NW, Washington, DC 20036.

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• "Cantilena Chamber Players" (March 31, 5:30 P.M.)—Founded in 1970, this New York-based group has received international acclaim. Hirshhorn Auditorium.

Membership benefits when visiting the Smithsonian

• The Associates' Reception Desk, in the castle, is open from 10 A.M. to 4 P.M. daily for registration, event-exhibit information and a special orientation publication.

• The Associates' Lounge, a quiet place to relax in the castle, is open from 10 A.M. to 5:30 P.M. daily.

• The Members' Dining Room, "The Court," in the Museum of Natural History, is open for lunch Monday through Friday from 11 A.M. to 3 P.M. and for breakfast weekends (8:30-11 A.M.) and brunch weekends (11 A.M.-3 P.M.).

• Discounts on all museum gift shop purchases.

For pre-visit information packet, send a postcard or phone the Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560 (202-381-6264). Allow two weeks for receipt.

Musical Weekend in May

The eighth annual Musical Weekend, sponsored by the Division of Musical Instruments and Friends of Music at the Smithsonian, is scheduled for May 4, 5 and 6. Festivities begin with cocktails and dinner at the historic Smithsonian castle, followed by a performance at the Kennedy Center and a post-curtain champagne reception. Saturday's events include a performance of Baroque dance, a luncheon cruise on the Potomac River, and tea with music at a handsome embassy residence. The highlight of the Smithsonian Chamber Players' evening concert is a performance on the newly acquired quartet of 18th-century Italian stringed instruments. Other events include a musical breakfast in the Grand Salon of the Renwick Gallery and also offer a private tour of the exciting new East Building of the National Gallery of Art.

Hotel accommodations for two nights and all meals and tickets are included. For further information and reservations, write Musical Weekend, Room 4123, Museum of History and Technology, Washington, D.C. 20560.

Smithsonian National Associate Regional Events Program

This month the Smithsonian's educational touring program goes to Denver (March 1-13) and Philadelphia (March 27-April 11). The Denver series, the first return visit to a city since the program began in 1975, highlights the construction of a new animal hands-on learning center at the Denver Zoo.

The Philadelphia program, the most extensive in the series to date, features more than 30 events, including a lecture by Joshua Taylor, director of the National Collection of Fine Arts. All will be offered to Smithsonian Associates in the area and members of 17 cosponsoring organizations. Invitational brochures arrive early March. For further details call (202) 381-6491.

Radio Smithsonian

This music-and-conversation program is broadcast weekly on approximately 50 stations across the country. For times (the program differs in Washington, D.C.) consult local public radio stations:

• "The Harmonious Craft" (week of March 4)—Included is a sampling of

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Exploring the World with the Smithsonian

For both the seasoned and would-be traveler, the Smithsonian has developed a travel program to meet a variety of tastes and budgets. In order to accommodate the increasing growth and interests of Smithsonian Associates, the tour programs have expanded, bringing travelers to places reflecting the Institution's interests.

Domestic Study Tours

Mississippi—April 19-26: The history and architecture of Jackson, Vicksburg and Natchez with local preservationists.

Big Bend—April 21-28: A nature tour of this Chihuahuan Desert wilderness park in southwest Texas.

History of the Federal City—May 16-20: Trace origins and development of nation's capital with visits to historic houses and districts, plus behind-the-scenes tour of Congress in session.

Chicago—May 24-28: Discover the architectural treasures of this vibrant city.

Magnificent Tetons—June 1-11: Hikes, field trips through the national park in cooperation with Teton Science School.

Shenandoah—June 1-10: Study the geology, archaeology and botany of these beautiful Virginia mountains.

Connecticut Antiques—June 17-24: Visit museums, special collections, historic houses, private homes and noted dealers.

Family Folk School—June 30-July 6: A creative, family-oriented week of crafts, dancing, music at J. C. Campbell Folk School in the mountains of western North Carolina.

Montreal/Quebec—June 30-July 8: Lectures, museum visits and walking tours trace the development of French culture in North America.

Collegiate Peaks of Colorado—July 28-August 6: Base camp nestled in alpine basin near Continental Divide provides ideal setting for environmental education.

Alaska—July 30-August 6: The serenity and natural wonders of Mt. McKinley National Park at Camp Denali, a wilderness retreat.

Pinewoods—September 4-9: British and American folk dancing and singing at rustic camp near Cape Cod.

Washington "Anytime" Weekend: Choose any weekend to visit original Smithsonian building, spend two nights at Loew's L'Enfant Plaza or Hyatt Regency Washington hotels, each close to the Mall, and see other sights in city by Tourmobile. Reservations and payments must be received at least ten days prior to arrival.

Foreign Study Tours

Greek Islands Cruise—April 22-May 5: Cruise on our own ship M/V *Neptune* to Aegean Islands and ancient sites in the Peloponnesus; leadership and archaeological lectures by Dr. Richard H. Howland, special assistant to the Secretary of the Smithsonian, John Jermain Slocum and Jerome Sperling; wild flower talks by John Morgan Bevan jr.; four days in Athens, its museums and neighboring sites for history and *flora Graeca*.

Copenhagen to Lisbon—August 17-September 3: Cruise on MTS *Argonaut;* transit the Kiel and North Sea canals; sail upstream on the Seine, Loire and Gironde rivers, with special visits to northern Spain and Portugal.

Foreign Charter Tours

The Bavaria of Ludwig II—April 8-23: Discover the splendor of Bavarian decorative arts and history with visits to special collections, architectural monuments, palaces, gardens and parks. Meet in New York for special orientation program; spend first week in Munich; travel second week through the Bavarian Alps and up the "Romantic Road" of Gothic towns and castles.

The Wild Highlands of Scotland—May 3-19: In cooperation with Aigas Field Centre, based in Victorian castle, explore magical scenery of central Highland glens. Evening lectures provide background for special hikes and field study of wildlife and natural history.

Paris and the French Countryside*—May 14-28: Museum lectures, walking tour of the islands of the Seine and excursions to Chartres and Malmaison plus a choice of a week-long travel seminar to Burgundy, Provence, or Normandy and Brittany.

Russia*—May 20-June 3: Leningrad, Tallinn and Moscow; see the Hermitage and Tretyakov Museums, the palaces of Pushkin or Petrodvorets, the ancient Kremlin with its old churches and Armory Museum; life-seeing visits to schools, factories or clinics; attend the best of Russian theater and circus.

Trans-Siberian Express—May 27-June 19: Fly from Seattle to Tokyo for tour on steamer to Nahodka; train to Khabarovsk, Irkutsk and Lake Baikal. Choice of four seminars: Samarkand, Bukhara and Tashkent; the cities of Old Russia; Outer Mongolia and the Gobi Desert; or the full Trans-Siberian experience.

Midsummer Night*—June 19-July 5: Tour begins in Rovaniemi, Finland, on Arctic Circle, ends in Helsinki. Celebrate year's longest day, travel through Lapland to mountains, fjords of northern Norway, go by coastal steamer to North Cape.

Scotland*—September 9-23: Edinburgh and beyond—a program of walking tours and special visits to castles, abbeys, battlefields and archaeological sites.

Oxford/Smithsonian Seminar—September 14-29: Select from unique curriculum taught by Oxford University faculty and live in Worcester College. Lectures, field trips and special seminars utilize rich resources of the town and university, the Ashmolean Museum and Bodleian Library.

Sultans' Treasures*—September 28-October 7: An adventure tour to Istanbul and Asiatic Turkey and a cruise on the Bosporus. Separate excursions to Aegean Turkey, or Anatolia and Cappadocia.

Spain*—September 30-October 14: Madrid and day excursions to Toledo or El Escorial. Week-long travel to the Basque country and Barcelona, Andalusia and Córdoba, or Santiago de Compostela.

Low-cost tours include first-class hotels, most meals, sightseeing, lectures, theater tickets, air fare. *Indicates optional predeparture course will be available.

Write Smithsonian Associates Travel Program, A&I 1278, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635.

handcrafted musical instrument sounds.
- "Life in Sculpture" (week of March 4)—Jo Davidson's vibrant portrait sculpture.
- "Mexico Today" (week of March 11)—The arts and music, people and politics of our southern neighbor.
- "The Art of Saul Steinberg" (week of March 18)—*New York Times* critic Hilton Kramer explores this New Yorker's (and *The New Yorker*'s) wide-ranging, ingenious creations.
- "Plants in Danger" (week of March 18)—Edward Ayensu, Smithsonian botanist, sounds alert for endangered plants (SMITHSONIAN, November 1978).
- "Visiting Literary England" (week of March 25)—How England's culture and people have shaped her writers; with British historian Ronald Dalzell.
- "Images of Edvard Munch" (week of March 25)—The great Norwegian artist (SMITHSONIAN, December 1978).

Contributing Memberships

Contributing Members of the Smithsonian Associates support the Institution's work in education, research and scholarship. Membership categories are supporting, $50; donor, $100; and sustaining, $500 (all tax-deductible within the limits of the law). Among special privileges offered are illustrated exhibition publications and invitations to selected previews. National contributing members receive advance notice and illustrated publications about SITES (below) and complimentary tickets for Regional Program activities in their area. For more information, write Contributing Membership Program, A&I Building 1208, Smithsonian Institution, Washington, D.C. 20560.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities throughout the United States. To sponsor a show in your community, write to Eileen Harakal, SITES, Smithsonian Institution, Washington, D.C. 20560. Here are some March openings:
- Riverside, California (March 17-April 15)—"Biological Photography," Loma Linda University.
- Palm Beach, Florida (March 3-April 8)—"Charles Burchfield: The Charles Rand Penney Collection," the Society of the Four Arts.
- Decatur, Illinois (March 3-April 1)—"American Drawings," Kirkland Gallery.
- Jackson, Mississippi (March 3-April 1)—"What's In A Map?" Department of Archives and History.

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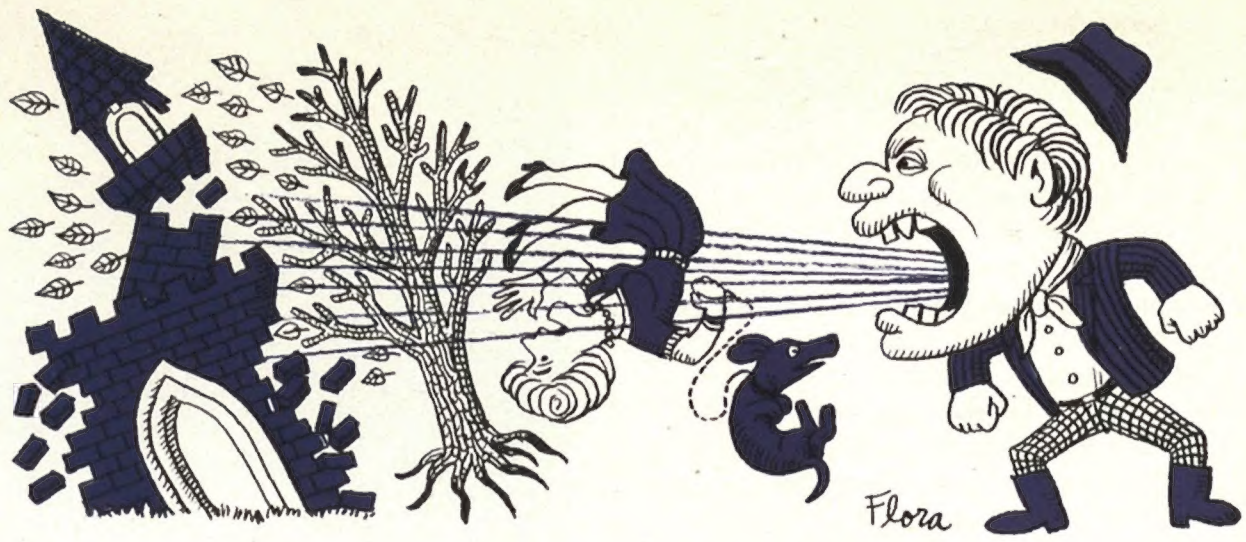
By Patrick Ryan

More clout per shout for loud mouths



My epiglottis ached in sympathy as I read the sad report that Terry Gripton, 30-year-old assistant shop manager of Stafford, England, failed by 2.5 decibels in Derby to break the world shouting record. He registered 108.5 decibels against the male record of 111 decibels. His wife said, "I'm not surprised he failed. He's really a very quiet man and doesn't even shout at me." (Possibly because he knows that the female record of 110 decibels outdoes him?)

The discovery that the female actually lags a bit behind the male in top vocal volume came as no small surprise to me, since all my experience of marital interchange indicates that the voices of wives are infinitely more penetrating than those of their husbands.

Though never one to interfere with other people's simple pleasures, I cannot forbear to wonder whether shouting contests are not anachronistic in these din-wracked days when, at the mere turn of a knob, the mumble of the illiterate and the twang of the unmusical in this disco-deafened world can boom forth with decibels enough to gorgonize us all.

In days before the devil procured the invention of the microphone, the vociferous ability to split eardrums at a hundred yards was essential in some professions. Lungs of brass were needed by town criers to ensure that nobody within the walls missed the nine o'clock news. Evangelists were obliged to cultivate voices of thunder so that their promises of hellfire might awaken repentance even in the hearts of the unheeding sleepers at the far back of the mission hall. And sergeants major, following in the echoes of Stentor, the Greek herald in the Trojan Wars, whose Homeric voice was as loud as 50 men combined, were forced to develop amplification so that their orders could be heard above the noise of battle.

It might seem strange to a visiting Martian to observe that in these present days of electronic warfare, when combat orders can be bounced 10,000 miles off satellites, sergeants major and their barrack-square minions still choose to communicate in the loudest bellow that can be mustered from a leather-bound larynx.

Such atavism springs perhaps from an inborn desire to intimidate all within earshot, like bull seals bellowing across their acquired portions of beach. And maybe also from the shouter's need to assure himself that he must obviously be a figure of importance if he makes more noise than anybody else. The popularity of this contention among those in authority was pointed up by W. C. Fields as he riproared his way through a Western imbroglio. "Why do you talk so loud?" asked an ear-aching character. "I HAVE TO TALK LOUD,' thundered William Claude. "I'M THE SHERIFF!"

High on the list of most effective shouts in history must stand the concerted crescendo belted out by the children of Israel outside the city of Jericho. On the seventh day of siege, after seven priests blowing seven trumpets had compassed the city seven times, at their last fanfare Joshua bade the people to shout with a great shout together—and the walls of Jericho just fell down flat.

I would not myself make much of a living as a hog caller, since I tend in eloquence to follow the peaceful dictum, "Never speak loudly to one another unless the house is on fire." My natural predilection to be a whispering baritone has been reinforced lately by learning that the human larynx is only about two inches long in a man, and slightly smaller in a woman. My ears presume, from long years of listening, that the female voice box must eventually expand to make up this inequality of size by sheer dint of constant exercise.

When air is expelled from the lungs and passes over the vocal cords, the larynx produces only the raw sound, which is then refined and shaped into articulate syllables by the throat, nose and mouth. Credulity strains to contemplate that from this tiny, two-inch apparatus Caruso could produce his golden bel canto, Chaliapin his bone-shivering profundities, Callas her soaring silver fountains and Skipper Kenny Leader that 111-decibel bawl with which he won the male shouting championship at Scarborough, England, in February 1973.

There do come times when even the most devoutly sotto voce among us are driven to raising our voices in wild tirade. Such unseemly resort to frenzied shouting is unavoidable, of course, when you've run out of further lines of logical argument, are trying to persuade a dachshund to do anything contrary to his momentary whim, or essaying to make meaningful contact with teen-age daughters who have taken unfathomable umbrage at something or other.

At which times you may envy the magical yell power of that mysterious chap in the recent film, *The Shout,* who learned during a sojourn in the back of beyond the handy secret of rubbing out people simply by shouting at them.

Twenty million years ago, the site of Marsha's discovery was a seashore. Now it's 40 miles from the sea, and half a mile down.

Marsha Green took a closer look at a 20-million-year-old seashore and found this new gas field.

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Spotted a trend

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Marsha pored over these records. And she began to spot a trend.

Textbook curve

Marsha persuaded Gulf management to drill five exploratory wells. Four were dry. But on one, the instrument that detects natural gas went right off the scale. "A real textbook curve," Marsha says.

Marsha persuaded Gulf management to drill a series of exploratory wells.

Such moments are rare. But Marsha is a dedicated professional. "I like to try to figure out what happened millions of years ago," she says, "and put the whole picture together."

Marsha Green. One of 52,000 Gulf people, meeting the challenge.

Gulf

Gulf people: meeting the challenge.

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